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THE LARGEST MECHANICAL CIRCULATION IN THE WORLD

MACHINERY

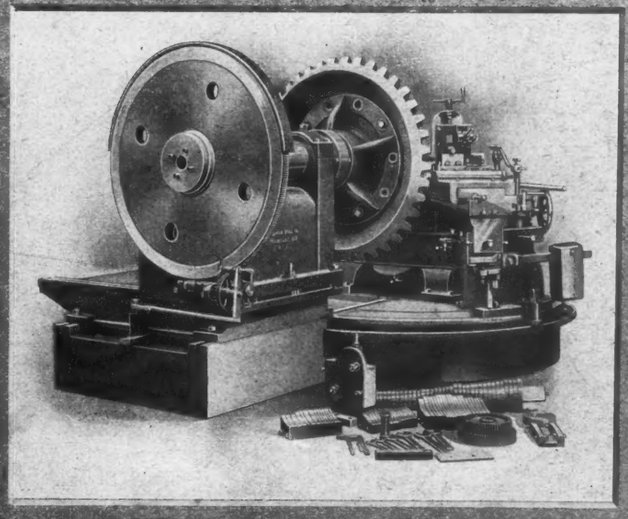
The Industrial Press New York

Regular Edition
Vol. 12. No. 12.

August, 1906.

$2.00 a year.
20 cents a copy.

GEARS
GEAR PLANERS



77" Bevel and Spur
GEAR PLANER

OUR EQUIPMENT PLANES DRIVING GEARS FOR AUTOMOBILES TO DRIVING GEARS FOR STEEL MILLS

AGENTS: BUCK & HICKMAN, London; CHARLES CHURCHILL & CO., London; FENWICK FRERES, Paris; SCHUCHARDT & SCHUTTE, Berlin

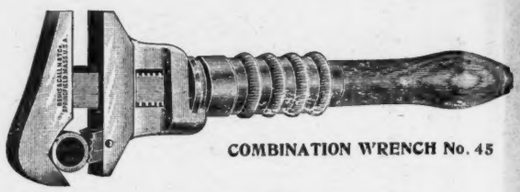
GLEASON WORKS
ROCHESTER, N.Y.

In the Shop or Out

There is no wrench that can beat our **No. 45 Patent Combination Wrench** for general utility.

It is a nut wrench of unequalled power and has all the necessary qualities for pipe work, in fact it is ready for any class of work that comes along, and takes the place of a special tool for each job. Strong, made with a long nut; head, bar and shank all one piece steel forging. All parts interchangeable. Five sizes.

ADJUSTABLE "S" WRENCH, No. 48



COMBINATION WRENCH No. 45

The Improved S Wrench

has the advantage of an adjustable jaw that does not project over the frame when open to its widest capacity in addition to all the other good qualities peculiar to this style of wrench. *Catalogue on request.*

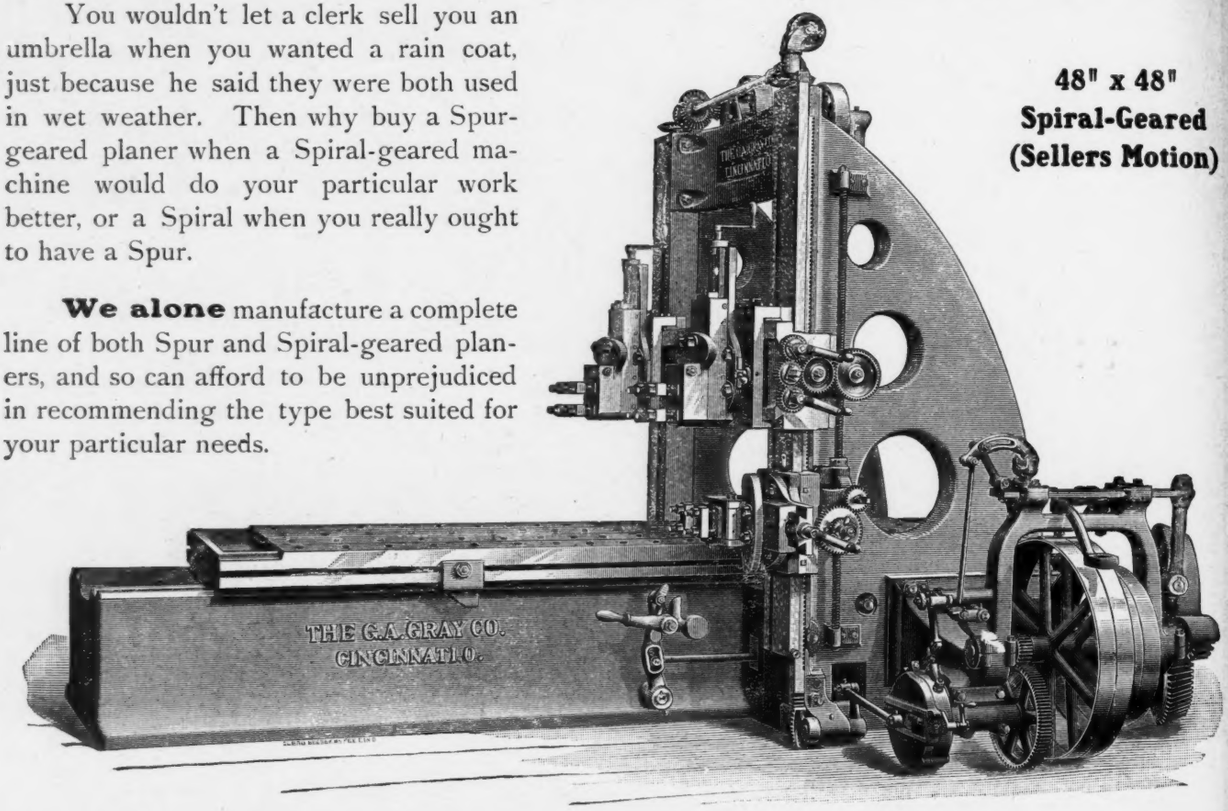
Bemis & Call Hardware & Tool Company

Springfield, Mass., U. S. A.

You wouldn't let a clerk sell you an umbrella when you wanted a rain coat, just because he said they were both used in wet weather. Then why buy a Spur-geared planer when a Spiral-geared machine would do your particular work better, or a Spiral when you really ought to have a Spur.

We alone manufacture a complete line of both Spur and Spiral-geared planers, and so can afford to be unprejudiced in recommending the type best suited for your particular needs.

48" x 48" Spiral-Geared (Sellers Motion)



The G. A. GRAY COMPANY, Cincinnati, Ohio

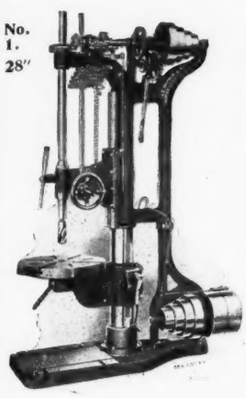
BUY STERLING HACK SAWS

THEY CUT AND WEAR WELL.

DIAMOND SAW AND STAMPING WORKS. BUFFALO, N.Y. U.S.A.

"STERLING" POWER HACK SAW MACHINES ARE MADE WITH TIGHT AND LOOSE PULLEY, WITH GRAVITY FEED, ARE GEAR DRIVEN, WITH AUTOMATIC SHUT OFF, WITH SWIVEL VISE.

"STERLING" BLADES ARE BEST FOR POWER HACK SAWS



Snyder Celebrated Upright Drills

Received the Medal at the World's Fair at St. Louis, 1904. Also the Approval of Master Mechanics of the best Equipped Plants in this Country.

ROCHESTER, N. Y., U. S. A.

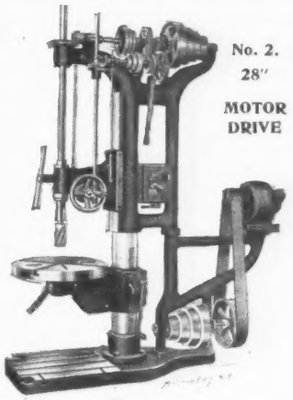
J. E. SNYDER & SON, 100 Beacon St., Worcester, Mass.

Gentlemen:—We have ten of your upright drills in use at our shop some ten years, and can say they exceed our expectations, in quality, workmanship, and the ease and rapidity of manipulation. They are superior to any upright drill made. Up to date we have laid out nothing for repairs.

Yours very truly,
THE RITTER DENTAL MFG. CO.

J. E. SNYDER & SON, Worcester, Mass.

Sizes 20-in., 21-in., 25-in., 28-in., 30-in. and 36-in.

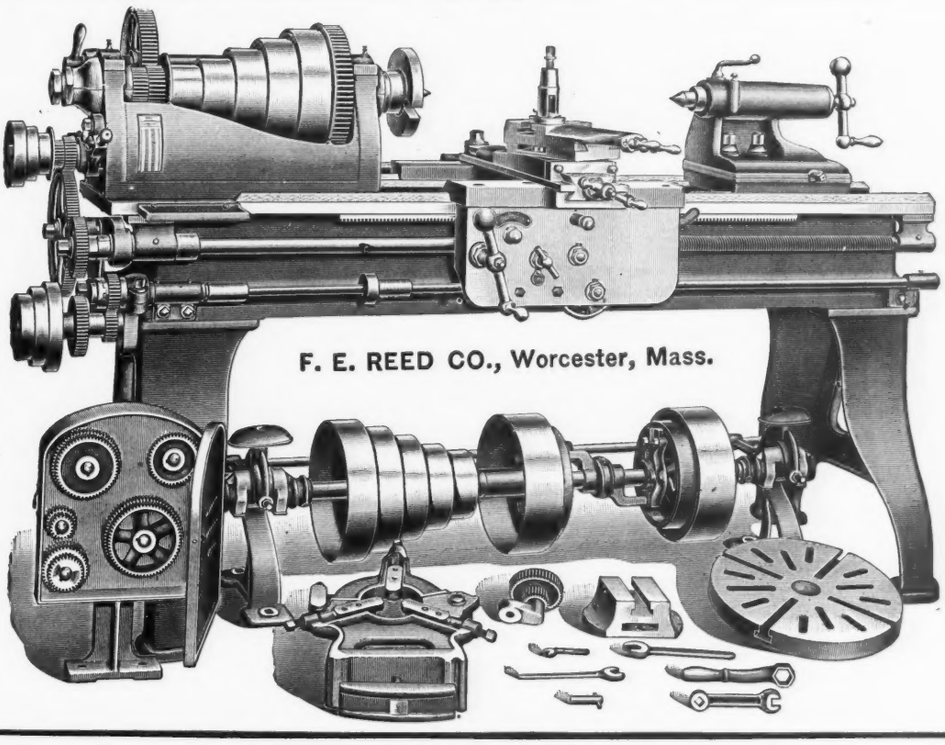


Accurate fits by hand scraping.
Practically perfect proportions.
The "little things" about it looked after with the utmost care.

16" GOLD MEDAL LATHE

The mechanical woods are full of Reed Lathes—

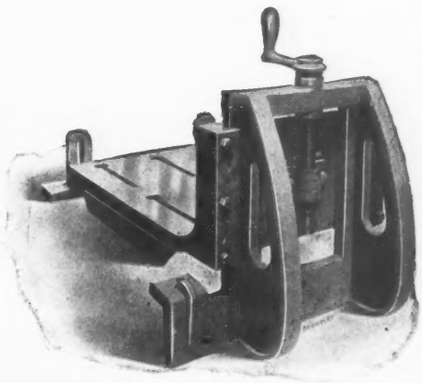
WHY?



Save the Cost of a Boring Mill

This convenient attachment—furnished for any size lathe—will convert your lathe into a Horizontal Boring Mill adapted for turning out first class work within its range. It is strongly constructed, easily and quickly adjusted, and not only is the clamping surface of the knee planed true with the spindle, but the upright surface of the rear is also squared so it can be used as a gauge surface in setting the work. With this device there is no necessity for blocking up the work, the tool forming a powerful boring mill without depending on the lathe centers. *Write for prices and particulars.*

(L. B. Flanders Machine Works.)



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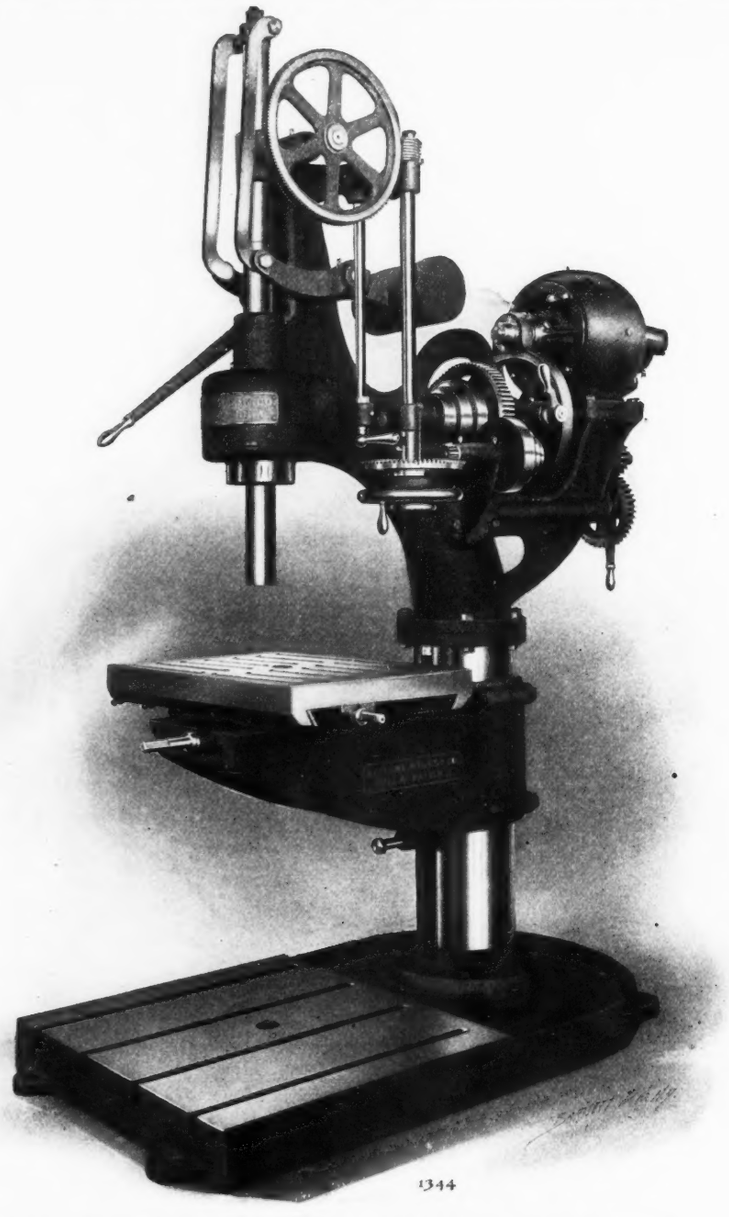
1025 Hamilton Street, PHILADELPHIA, PA.

HEAVY Drilling Machines

Vertical, Plain and Universal Radial, Swinging Drills, Adjustable Multi-spindle, Multiple, Rail, Locomotive Frame, Arch Bar, Tube and Gun Barrel, Rifling, Etc., Etc.



50" Bement Vertical Drilling Machine.
A very rigid and heavy machine for general work.
Early deliveries on 40", 50" and 60" machines.

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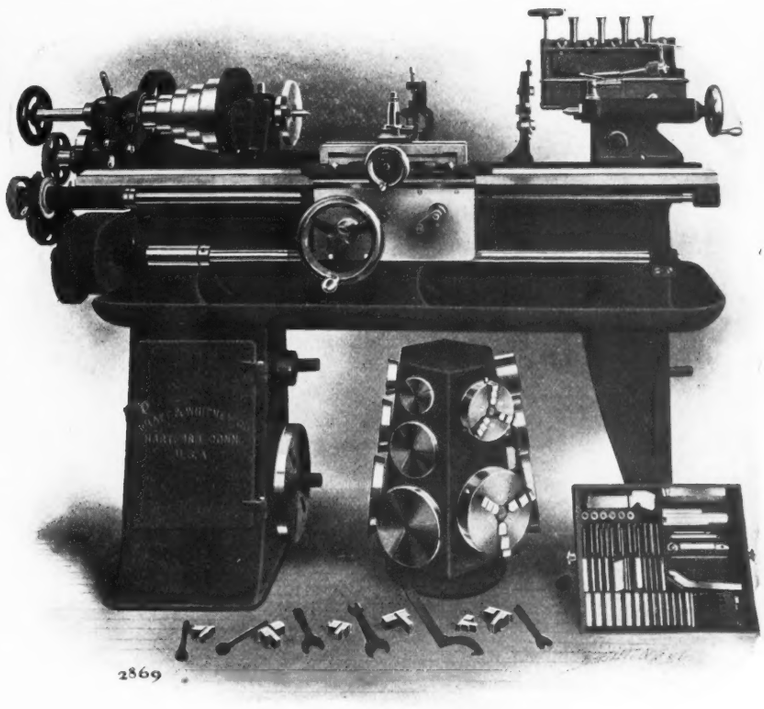
Machinists' Small Tools and Gauges

of the Highest Grade Obtainable.

Small Tool Catalogue on request.



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Precision Machine Tools

of all kinds.

Designed to Increase Output with Greater Degree of Accuracy.

Catalogues on request.

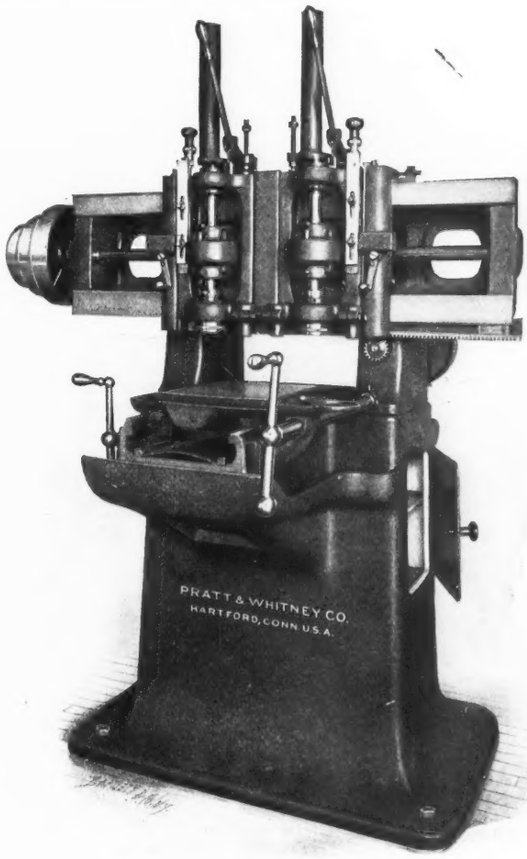
Ten-inch Toolmakers' Engine Lathe with Plain Elevating Rest

Ten-inch Toolmakers' Engine Lathe

For Toolmaking and other Precision Work.

Indispensable in the up-to-date shop.

Our lathe book, which fully describes this machine, will be sent on request.



Profiling Machines

Built with one or two Spindles.

Especially adapted for finishing parts of guns, sewing machines and any other accurate and interchangeable work, doing away with hand fitting.
Illustrated circulars on request.

No. 12 Two-spindle Profiling Machine

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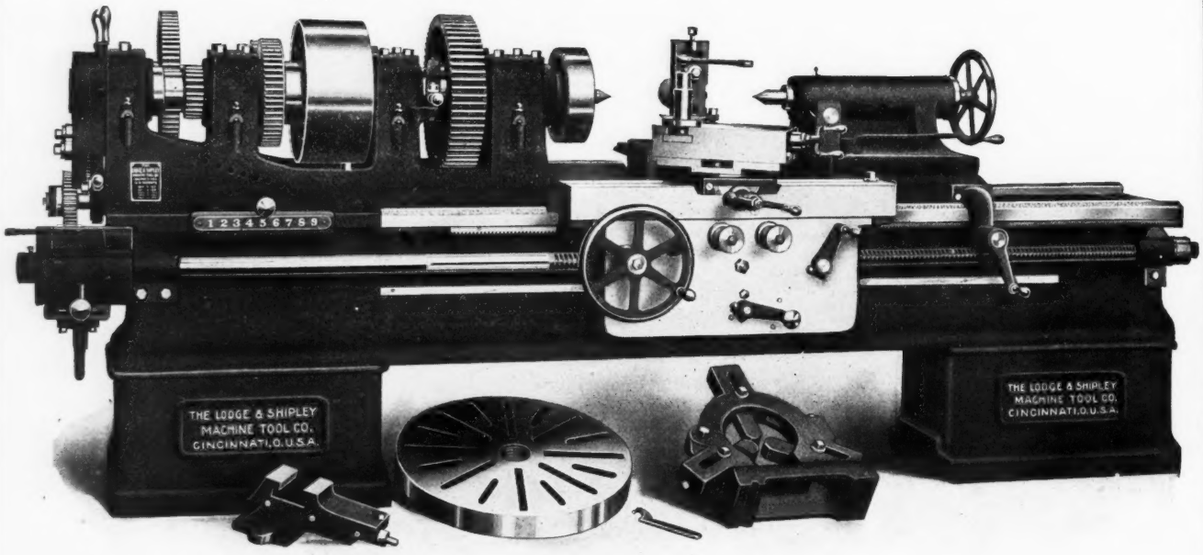
"MORE LATHE WORK WITH FEWER LATHES."

IDLE LATHES



Take a walk through your shop; see if you have any idle lathes; IF SO, WHY?

Is it because they are not adapted to the work to be machined?

In buying the Lodge & Shipley Patent Head Lathe, you buy a lathe that WILL DO EVERYTHING TO BETTER ADVANTAGE than a cone pulley engine lathe of similar size.

Catalogue "R" explains why fully.

Sizes 14-inch to 48-inch Swing.

The Lodge & Shipley Machine Tool Co.

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CANADIAN AGENTS—H. W. Petrie, Toronto, Ont. Williams & Wilson, Montreal, Can. EUROPEAN AGENTS—C. W. Burton, Griffiths & Co., London. V. Lowener, Copenhagen and Stockholm. R. S. Stokvis & Zonen, Rotterdam. Alfred H. Schutte, Paris, Cologne, Barcelona, Brussels, Milan. Schuchardt & Schutte, Berlin, Vienna, St. Petersburg. Werner Hult, Helsingfors. Adolfo B. Horn, Havana.

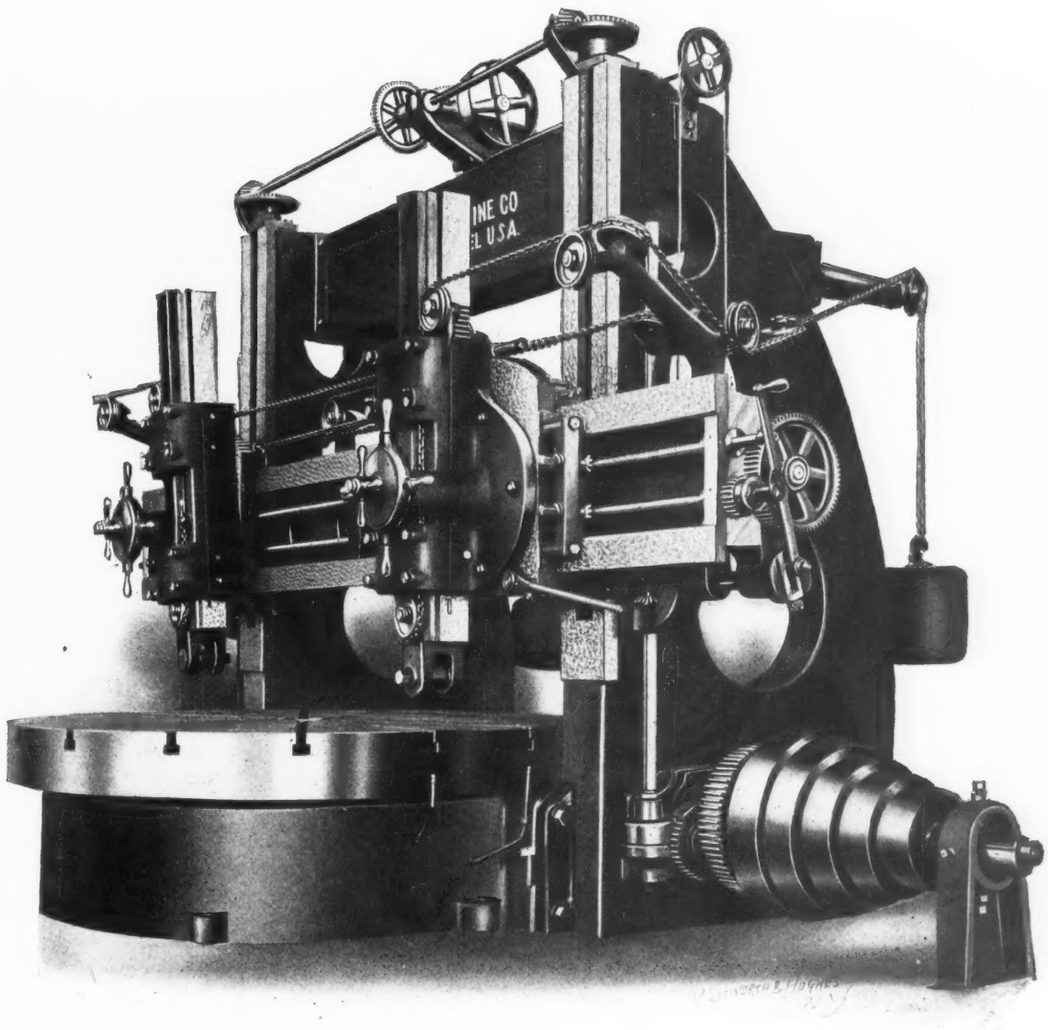
BETTS MACHINE COMPANY

WILMINGTON, DEL., U. S. A.

MAKERS OF

Heavy Machine Tools

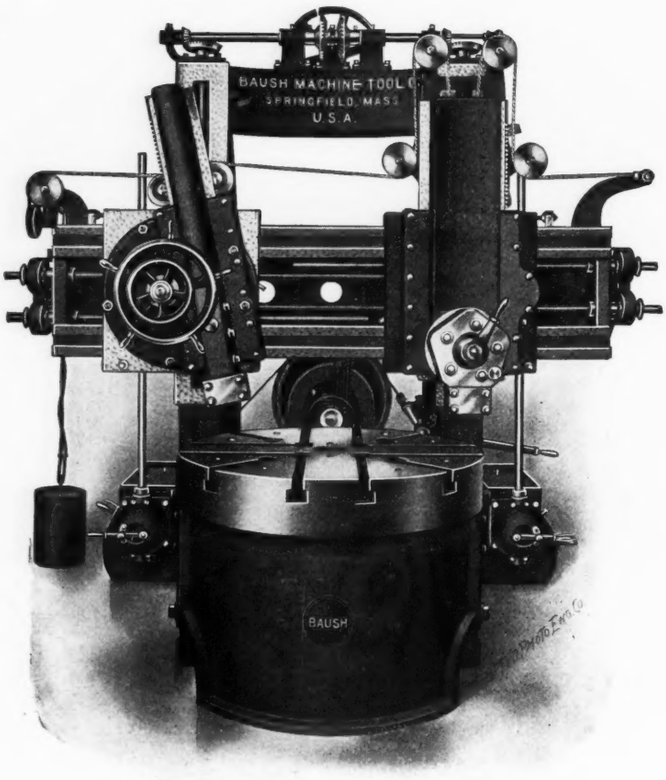
FOR HIGH SPEED STEEL



THE BETTS STANDARD BELT-DRIVEN 7-FT. BORING AND TURNING MILL

Vertical Boring and Turning Mills, Horizontal Boring and Drilling Machines, Planing Machines, Slotting Machines, Etc.

A Rigid and Powerful Boring and Turning Mill for Heavy Work



THE BAUSH 42-INCH BORING AND TURNING MILL takes a prominent place among heavy machines of this type and can be counted on for first-class work in quick time. It is built with one swivel head and one turret head—each entirely independent in its movements both as to direction and amount of feed; either can be brought to the center for boring, and both have a vertical movement of 24 inches. Rigidity of the spindle and table is secured by straight and angular bearings, which, acting in conjunction, relieve the side strains. Any lifting tendency of the table is further counteracted by a thrust ball bearing on the lower step of spindle. Feeds are positive and have 15 changes ranging from $\frac{1}{64}$″ to $\frac{61}{64}$″ horizontally and $\frac{1}{64}$′ to $\frac{9}{64}$″ in angular and vertical directions. All improvements contributing to ease and rapidity of operation, safety, and economical production are incorporated in the design of this machine.

Furnished with two regular swivel heads if desired. Belt or motor drive.

Full particulars will be furnished by the makers.

BAUSH MACHINE TOOL COMPANY

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An Unlimited Range of Threads and Feeds

is one of the many advantages of the

Bradford 14" Quick Change Gear Lathe

This advantage alone would put the machine in the front rank among Screw Cutting Lathes; there are feeds for chasing all standard threads, right or left hand, and extra gears can be supplied for any special thread desired. Rapidity in operation, simplicity and convenience are further good points. It has the most direct drive from spindle to lead screw or feed rod; cluster can be cut out entirely, driving the screw direct with ordinary change gears; automatic stops for feeds; adjustment provided admits of correctly meshed gears in case of wear; no tumbler used in the gear box. All parts are easily accessible, there is one lever for all threads, the screw is not in motion except for screw cutting, and feeds without the removal of a gear. We make a line of Lathes from 14″ to 42″ swing, and shall be glad to send you catalogue with full description of this and other sizes.

The Bradford Machine Tool Co., Cincinnati, Ohio

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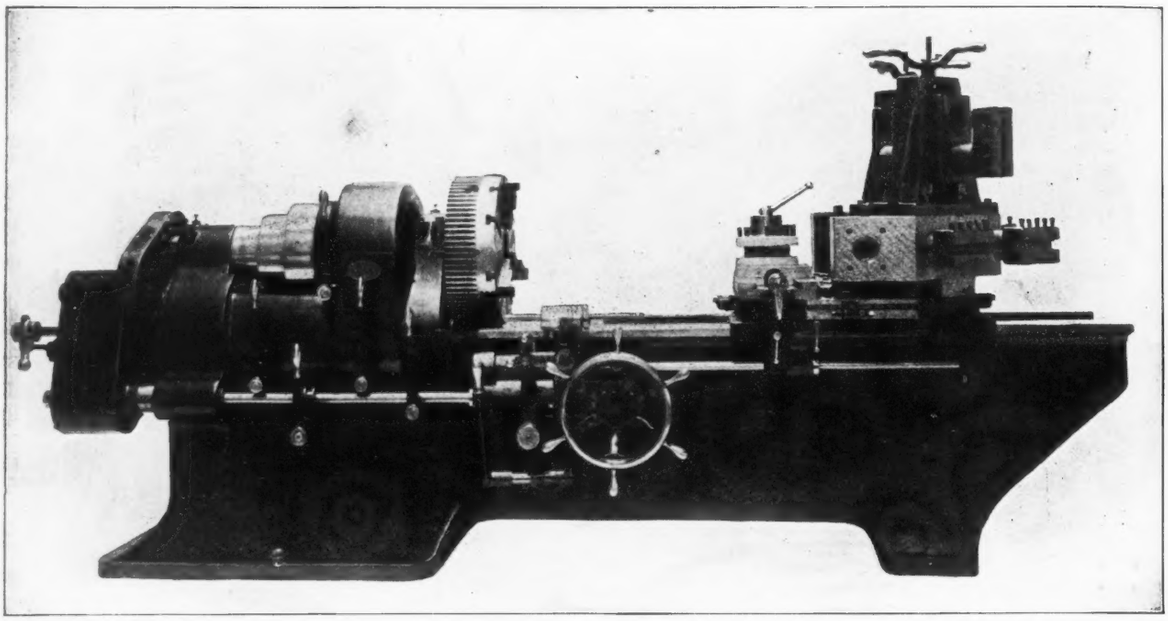
IMMEDIATE DELIVERY



AMERICAN TURRET LATHES

We offer for sale a few of these machines in the 24-inch size, built by J. Morton Poole Co., of Wilmington, Del. Machines ready for immediate shipment. Can furnish either with gap or plain bed.

Write for GISHOLT *further particulars.*

GISHOLT MACHINE COMPANY

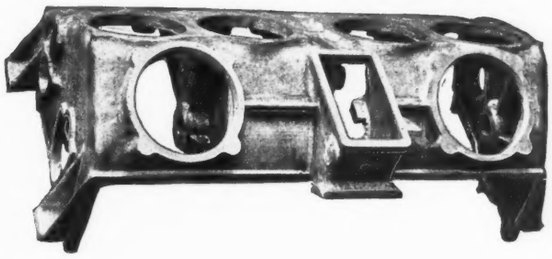
ENGINEERS, MANUFACTURERS

1316 Washington Ave., Madison, Wis., U. S. A.

FOREIGN AGENTS—Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona. Schuchardt & Schutte, Vienna, St. Petersburg, Stockholm, Berlin. C. W. Burton, Griffiths & Co., England.

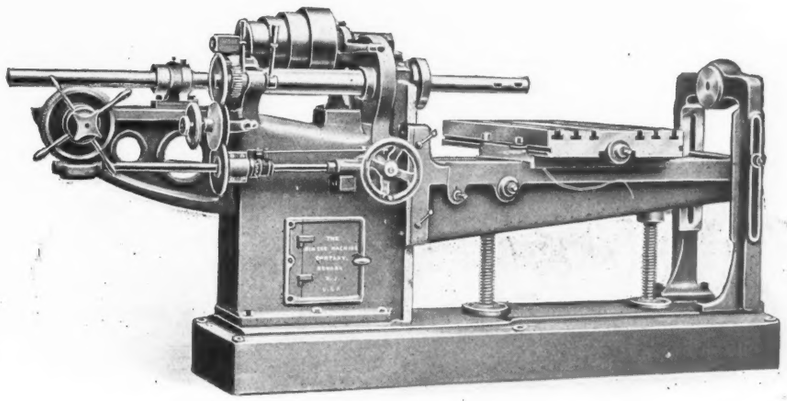
Automobile Crank Shaft

and



Transmission Cases

Bored quickly without or with a fixture by our



No. 3 Machine

We adapt this machine to meet the exact conditions.

We have also, **other machinery for automobile case boring and milling.**

THE BINSSE MACHINE CO.

NEWARK, NEW JERSEY

AGENTS: CHAS. CHURCHILL & CO., LONDON.
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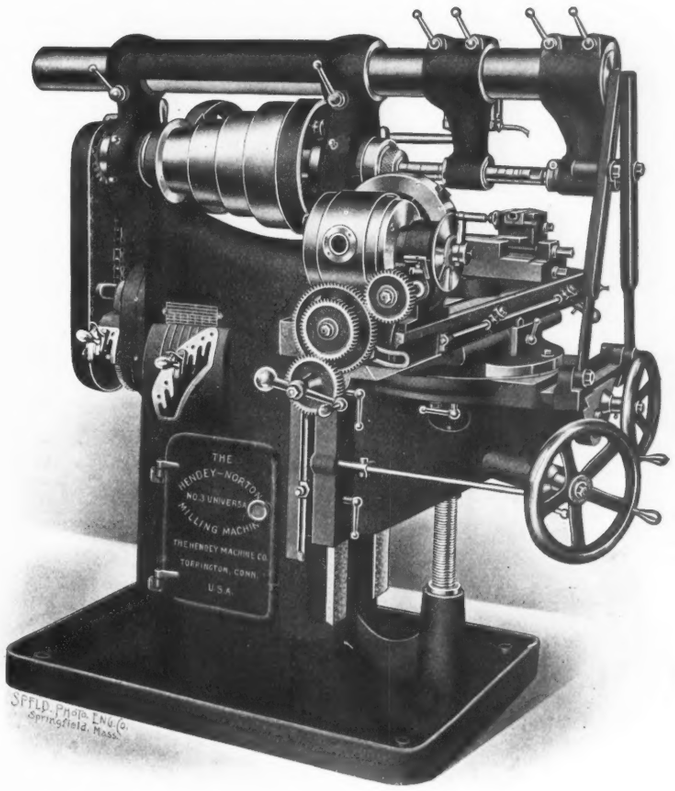
Engineers and Importers of Machinery
and Technical Appliances.

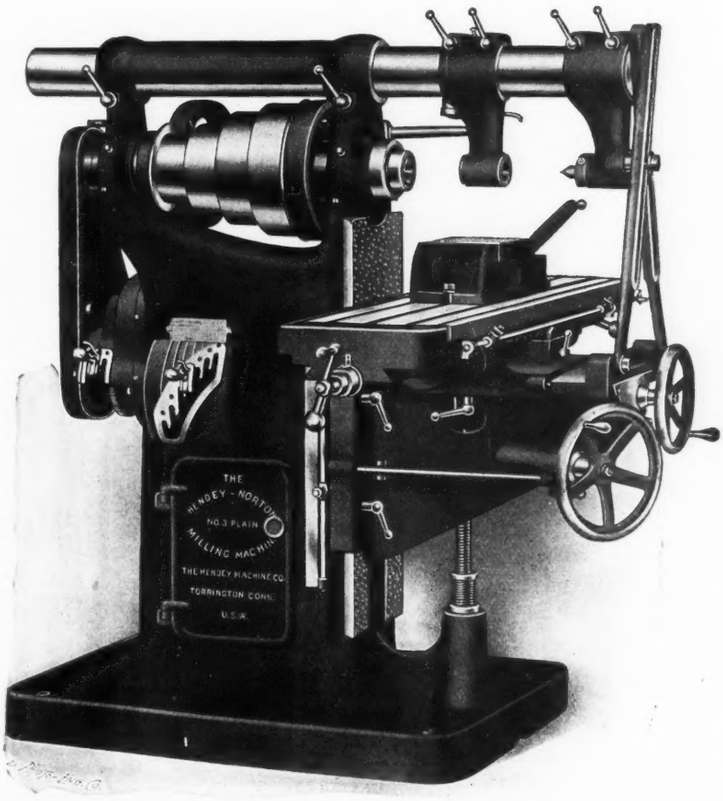
Hendey-Norton Milling Machines

No. 3 Universal Machine

Feeds, 30 x 10 x 19, *all automatic.*
21 changes of feed, *all positive geared.*



Spindle construction of these machines is our *standard taper journal type*, running in *annular bearings fitted with ring oilers.* Elevating and longitudinal feed screws fitted with ball thrusts.



No. 3 Plain Machine

Feeds, 34 x 10 x 20, *all automatic.*
21 changes of feed, *all positive geared.*

Send for illustrated and descriptive matter.

The Hendey Machine Company

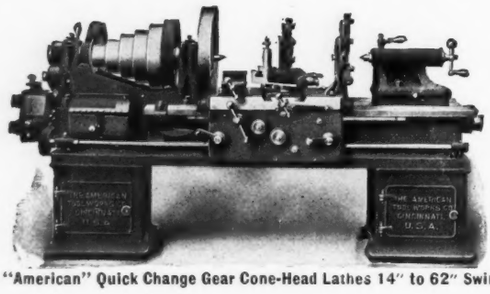
Torrington, Conn.

AGENTS: Manning, Maxwell & Moore, Inc., Boston, New York, Philadelphia, Pittsburgh, Chicago. The W. M. Pattison Supply Co., Cleveland. C. W. Burton, Griffiths & Co., London, England. Heinrich Dreyer, Berlin, Germany. Takata & Co., Japan.

Does Shop-Cost Count with You?

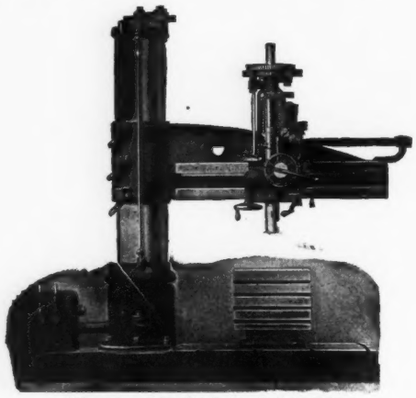
Does Speed? Does Saving?

If so, investigate the merits of "American" Tools.



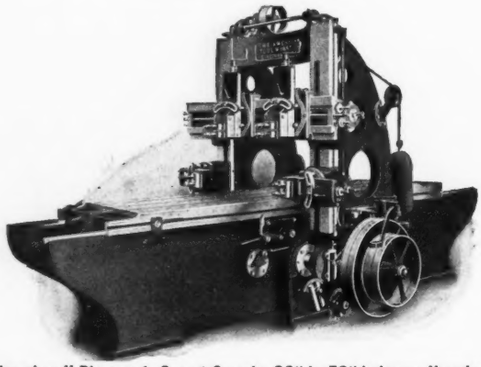
"American" Quick Change Gear Cone-Head Lathes 14" to 62" Swing

We apply our "Patented" All Gear Head to any size **"American" Lathe.**



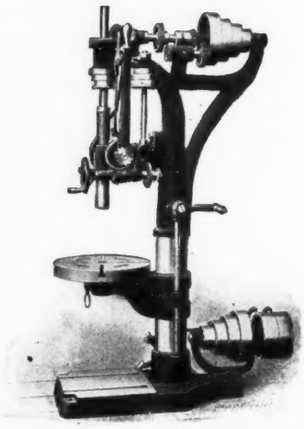
"American" Radial Drills 2½' to 7' Arm.

Our **Plain Radials** have broken all records for Rapid Drilling.



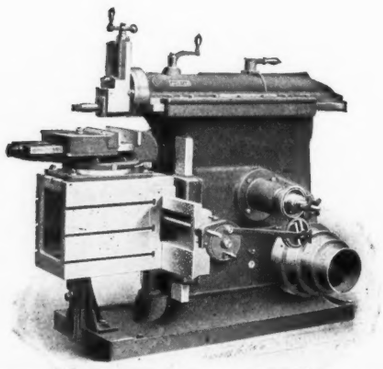
"American" Planers 1, 2 or 4 Speeds, 22" to 72" between Housings.

"American" Planers with variable speed in both Standard and Widened Patterns.



"American" Drill Presses 13" to 36" Swing.

"American" Upright Drills are stiff and accurate, the Sliding Head type having geared power feed.

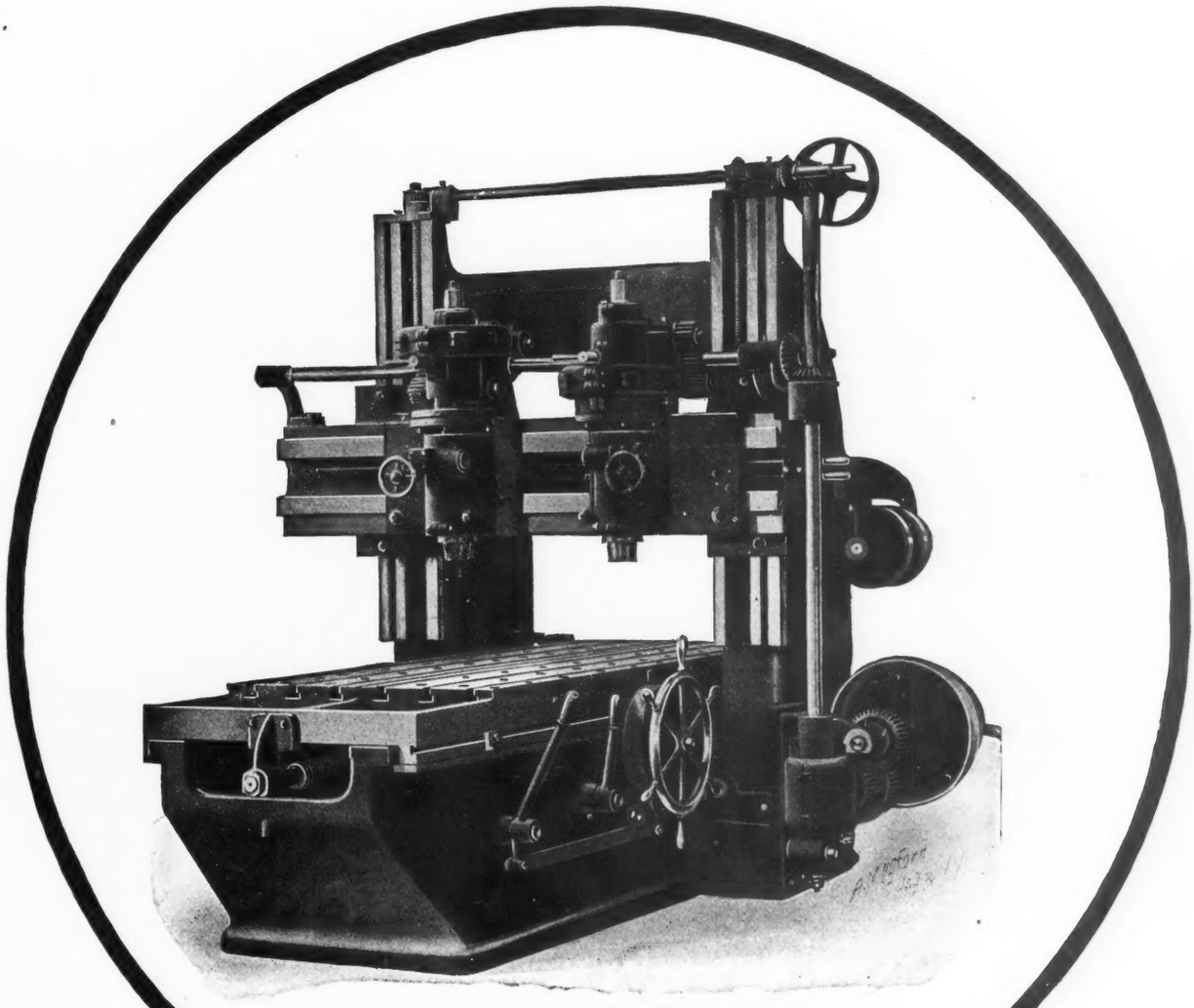


"American" Shapers for Heavy Duty 16" to 28" Stroke.

The **New "American" Shaper** (just out) is a marvel in its capacity for heavy cuts and accurate work.

THE AMERICAN TOOL WORKS COMPANY,

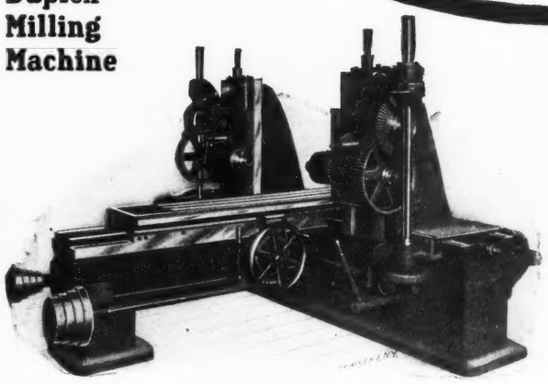
CINCINNATI, OHIO, U. S. A.



No. 4 Vertical Two Spindle Milling Machine

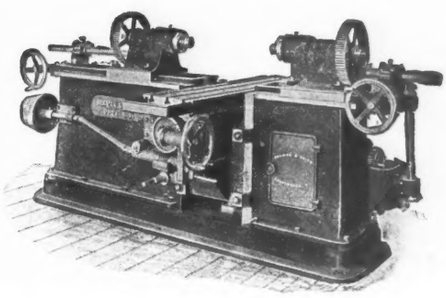
With this machine a great variety of speeds is attainable, making the use of cutters of comparatively small diameters or large diameters equally feasible.

No 3 Duplex Milling Machine



No 2 Duplex Milling Machine

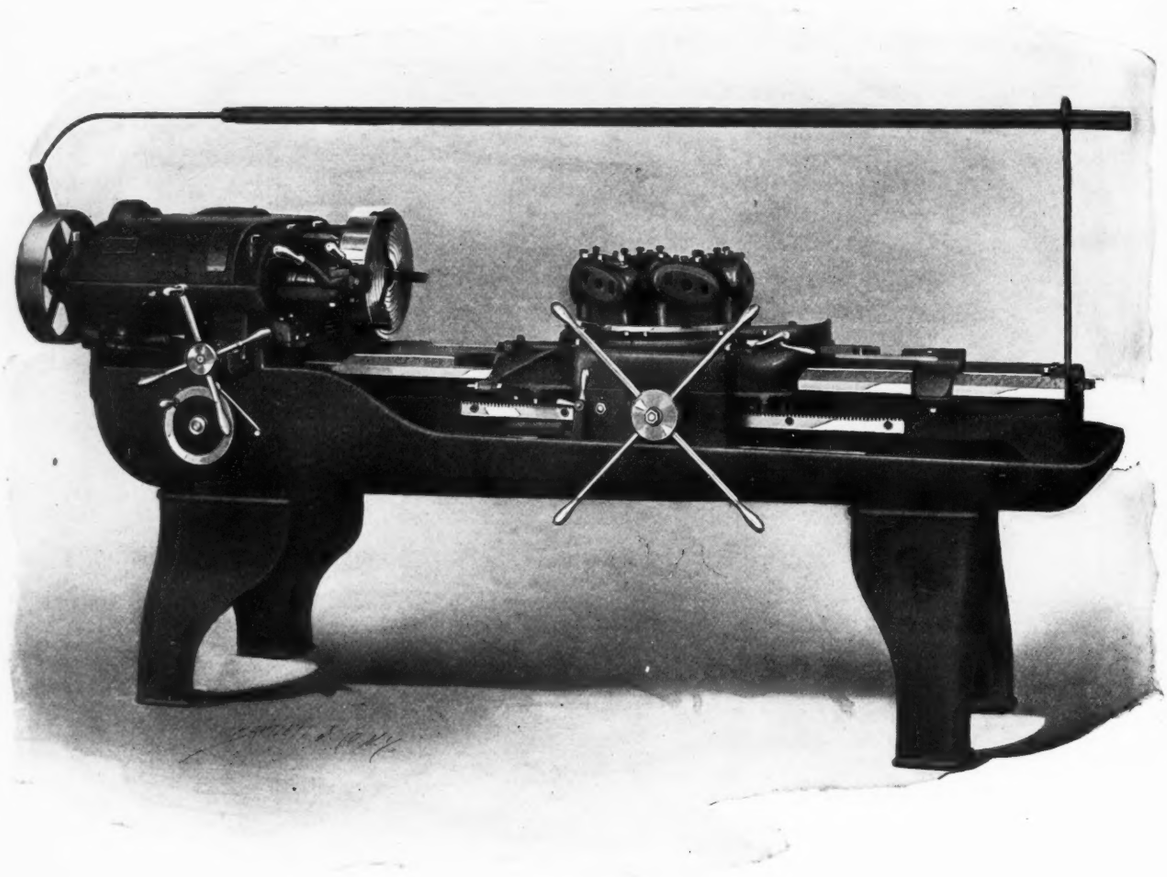
Catalogue mailed on request.



THE BEAMAN & SMITH CO.

PROVIDENCE, R. I., U. S. A.

AGENTS—Chas. Churchill & Co., London, England. Fenwick Freres & Co., Paris, France.
Ludw. Loewe & Co., Berlin, Germany.



Chattering is caused by conditions that are fundamentally objectionable. Every boy knows that he can make a cane chatter along the sidewalk by pushing it ahead at a given angle, and that it will not chatter when dragged at same or any other angle.

The draw-cut shaper astonished many by its wonderful performances of great stock-removing feats, and although this may not be what is primarily wanted in a shaper, it may be cited as an example of the performance of a cutting tool under a pulling cut and non-chattering conditions.

In the lathe, planer, standard shaper and boring mill there seems to be good reason for using the tool mounting that is equivalent to the chattering cane. The expression, "cart before the horse" fits the case, but the plow before the horse would be a better analogy.

In order to offset the chattering tendency in machine tools of thirty years ago, a spring tool was used for finishing cuts which required a tool having plenty of rake. Under the varying strains this tool would yield in opposite direction to its frail mounting; that is, it would spring away from the work under an increased strain, while the slide rests had a tendency to tip over towards the work, which would otherwise cause the tool to "duck in." The yielding of

The Construction of the Flat Turret Lathe Gives a Control of Work and Tools that Greatly Reduces the Tendency to Chatter—

This, in itself, is no mean advantage—it assures accurate work, permits the use of sharper tools with plenty of rake, and broader tools for light and heavy cuts, and dovetails with other improvements that make the Flat Turret Lathe the leader that it is.

The absolute control of tools is attained by the direct and rigid connection of the turret to the carriage, and the carriage to the lathe bed. The head is gibbed directly to the bed by a special system of gibbing which puts the

JONES & LAMSON

Springfield, Vermont, U. S. A.

Germany, Holland, Belgium, Switzerland, Austria-Hungary, M. Koyemann, Charlottenstrasse, 112 Dusseldorf, Blanche, Paris, France. Italy,

gib and its thrust taking screws under severe tension, even when adjusted for the free movement of the slide. The object of this is to take up all spring of the bolt and gib before the strain of the work comes on it—a detail of construction, but a detail that counts.

The Flat Turret Lathe is a time saver and a cost reducer on lathe work of all kinds within its range, but especially does it score in duplicate work. It has facilities for handling such work with greater rapidity than other machines, and with a degree of accuracy that is unparalleled. The ten stops for the cross-sliding head combined with the twelve stops for the turret, together with the complete outfit of tools, all of the simplest and stiffest construction, make the machine ready to begin work as soon as it is supplied with power. The turret turns to present each tool to the work, and the travel of the turret carriage lengthwise, with the cross travel of the work carrying head stock, combined with the turning of the turret, bring all the necessary changes of position of work and tools. The Flat Turret Lathe is adaptable, efficient, universal—made in two sizes, 2x24″ and 3x36″, and will effect a saving on your lathe work ranging from 50 to 80 per cent. Write us for particulars.

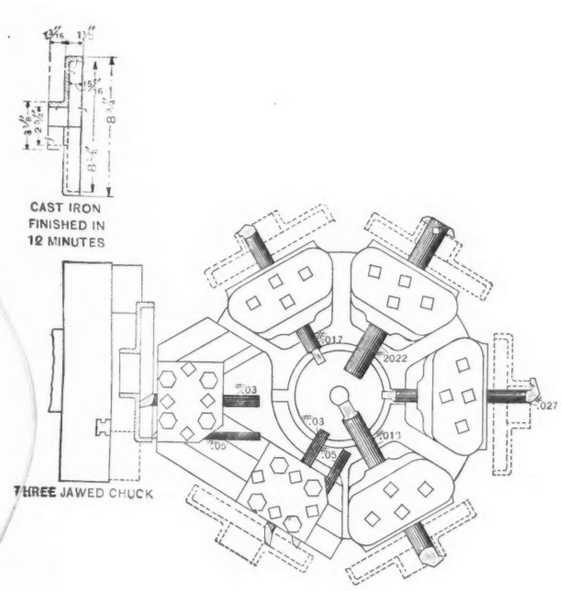
the tool would offset the chattering tendency.

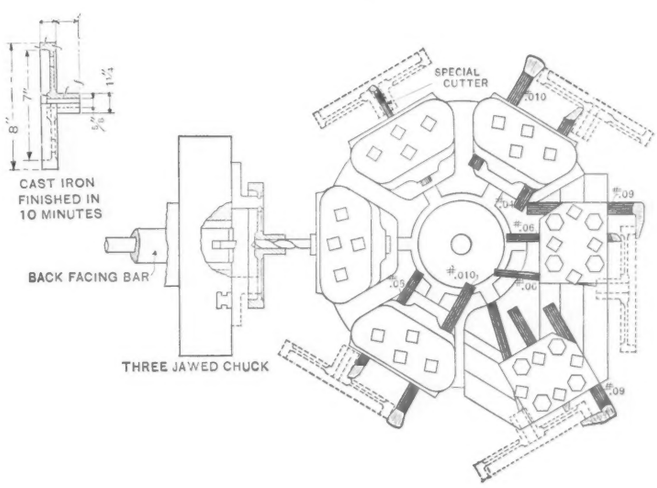
This tendency to chatter has been partly met in present-day machines by making all these slides of stiffest form possible, so that it is no longer necessary to use the old-fashioned spring tool. But the fact remains, that although we have greatly reduced the chattering, we have yet the plow before the horse and the cane ahead of the boy; that is, the tendency remains, and the conditions exist to a sufficient extent to necessitate the use of blunt tools for heavy chips, and to greatly restrict the use of broad tools for forming taper and irregular cuts.

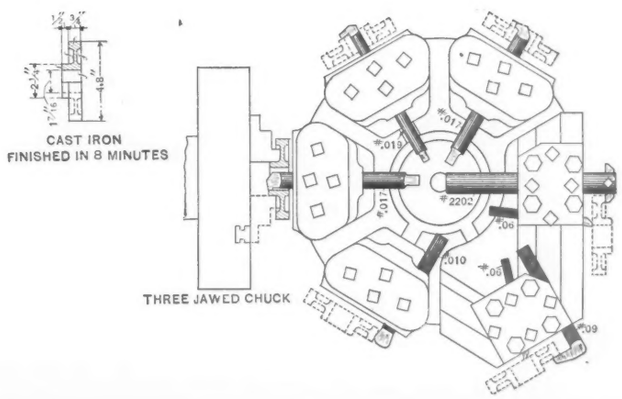
The detailed description and illustrations of the machine described clearly bear evidence of a more perfect control, which is the result of a very low swing, and an absence of long-distance control and slide on slide tool mounting.

Inasmuch as the dimensions of work affect the design of machine, that is, a planer must be used for long work, while the shaper is best for short work, from here on we will limit our discussion to the work under 12 inches and 14 inches diameter, for which the flat turret lathe is built.

—*Evolution of the Machine Shop*







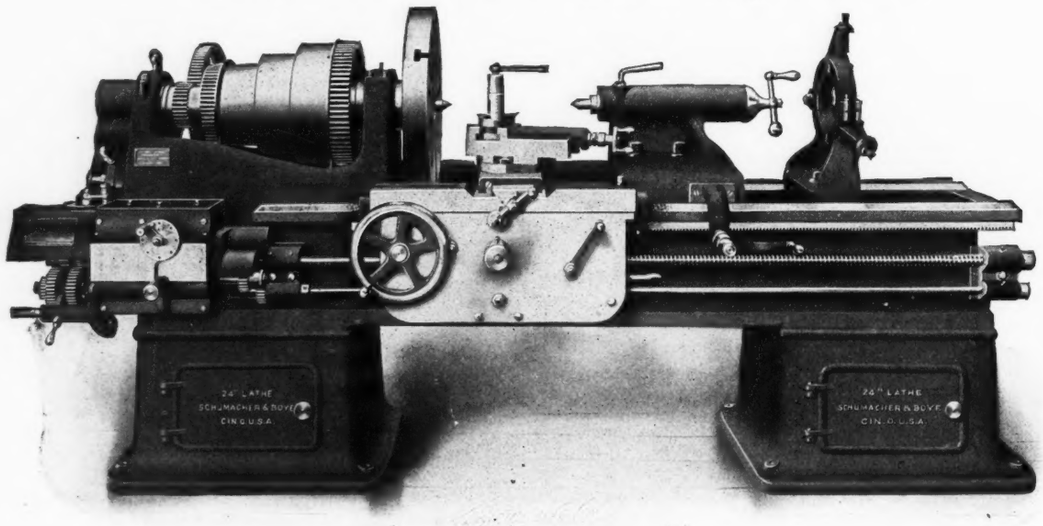
MACHINE COMPANY

97 Queen Victoria Street, London, E. C.

Germany, France and Spain, Ph. Bonvillain and E. Ronceray, 6 Rue Adler & Eisenschitz, Milan, Italy.

SCHUMACHER & BOYE

24-inch Double Back Geared Engine Lathe



24-inch Double Back Geared Instantaneous Change Gear Engine Lathe.

This lathe with three-step cone and double back gears, permits the use of a wide belt and high velocity for high cutting speeds. An up-to-date tool for rapid manufacturing.

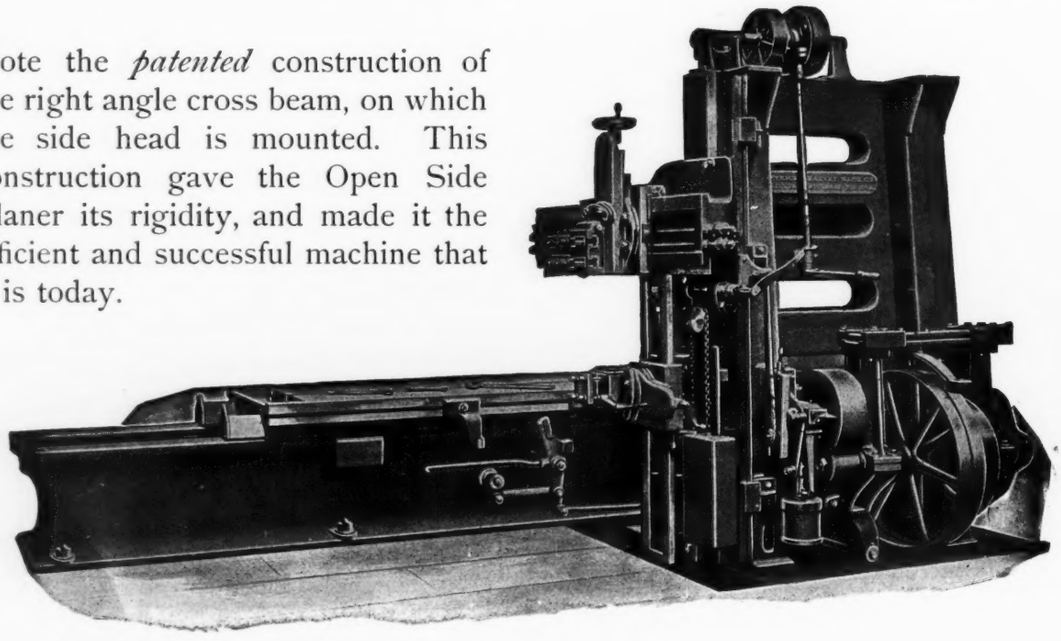
SCHUMACHER & BOYE, ENGINE LATHES, CINCINNATI, OHIO

Ph. Bonvillain, 17 and 19 Villa Faucheur, Paris, France. Ludwig Loewe & Co., Hutten-Strasse, 17-20 Berlin, Germany. Buck & Hickman, 2 and 4 Whitechapel Road, London, E. England. Takata & Co., Japan.

The D. & H. Open Side Planers

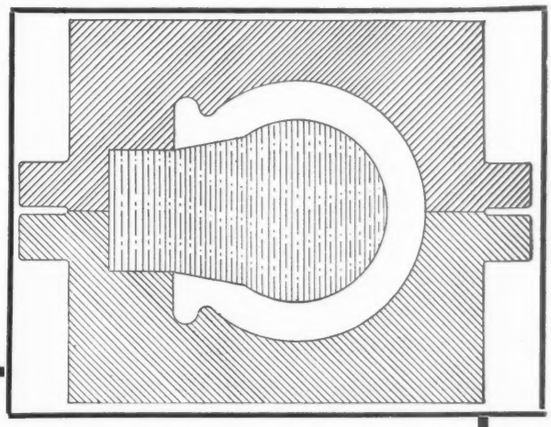
WIDE RANGE GREAT ADAPTABILITY RIGID POWERFUL ACCURATE

Note the *patented* construction of the right angle cross beam, on which the side head is mounted. This construction gave the Open Side Planer its rigidity, and made it the efficient and successful machine that it is today.



The Detrick & Harvey Machine Co., Manufacturers, Baltimore, Md.

A Saving of Seven Hours on Auto Tire Molds



These 34″ chilled-iron tire molds, from which about ¼″ stock is removed, are roughed out with a single-point roughing tool and finished with a form tool in 9¾ hours on a Bullard 51″ Standard Boring and Turning Mill, while it used to take from 16¾ to 17 hours to do them on a 60″ Engine Lathe.

And on the Engine Lathe a helper was necessary in order to fasten the pieces to the face-plate, while the operator can easily set and adjust them on the table of a Bullard Mill without any aid.

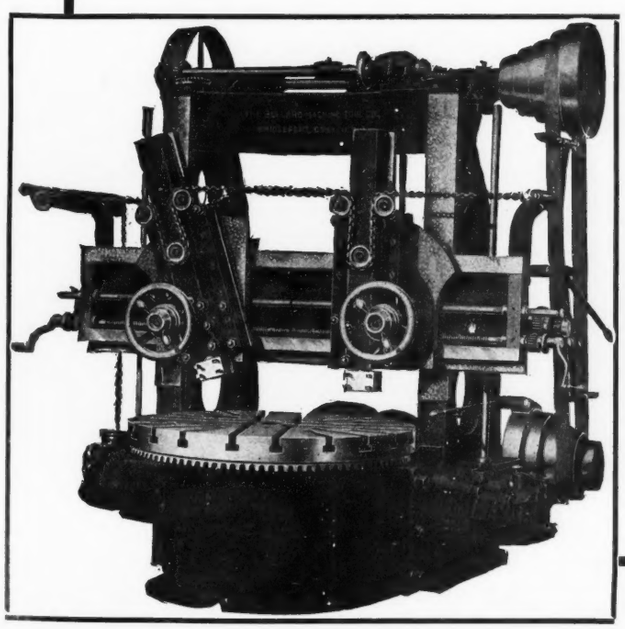
The molds are also finished complete, without a tooth or a chatter mark, on the

BULLARD MILL

while, when done on the Lathe, considerable hand work was necessary to make them smooth.

This smooth-cutting feature of Bullard Mills, even when taking heavy cuts at high speeds, is a rare quality. Money and brains alone cannot produce it. It takes years of actual experience in the building of Boring and Turning Mills to know just how they must be designed and built to secure this very essential feature.

When you do your work on a Bullard Mill you not only know that it is being done in the quickest possible time, but you can also rely on it being done accurately.



There's a Bullard Mill for every boring and turning requirement. The various sizes are illustrated and fully described in our new catalog No. 31. A copy is yours for the asking.

The Bullard Machine Tool Co.

531 Broad St., BRIDGEPORT, CONN., U.S.A.

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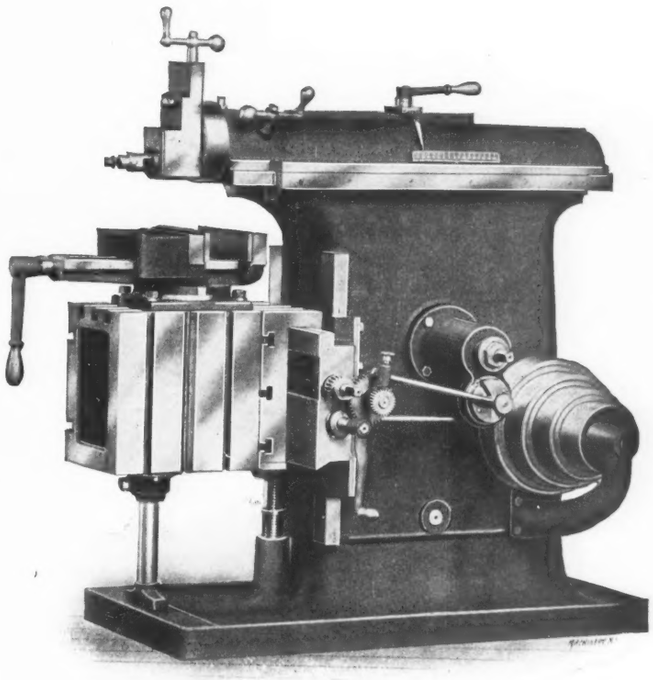

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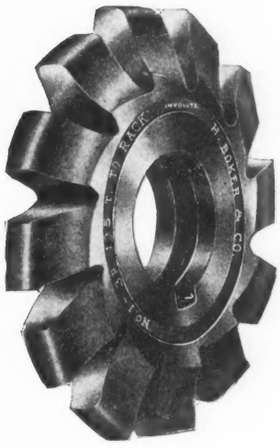

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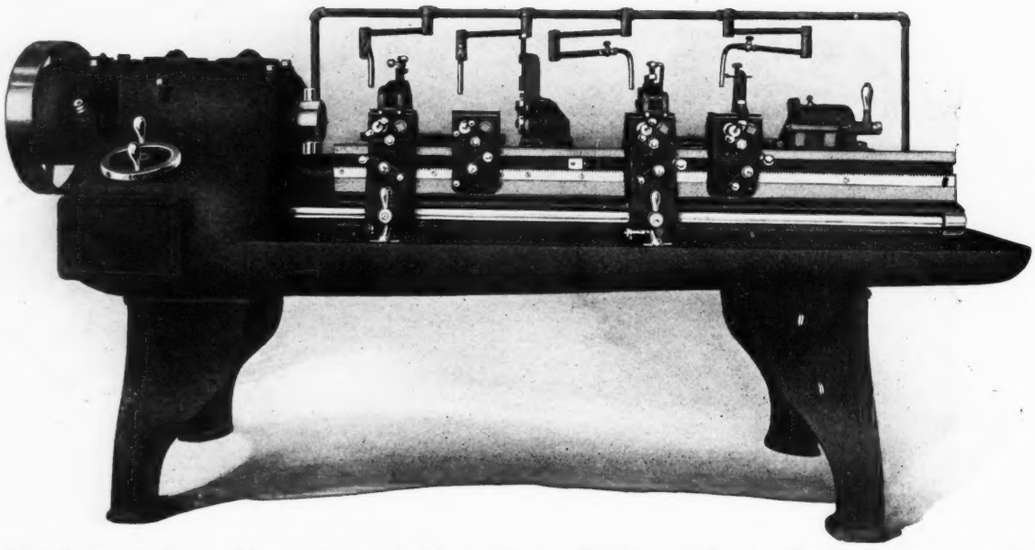

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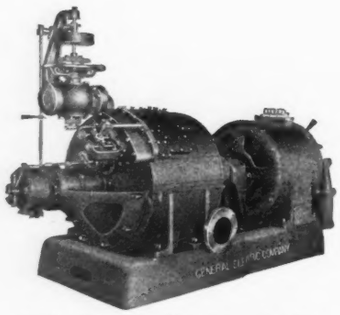

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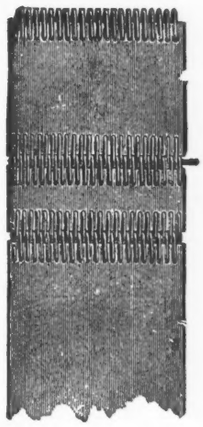

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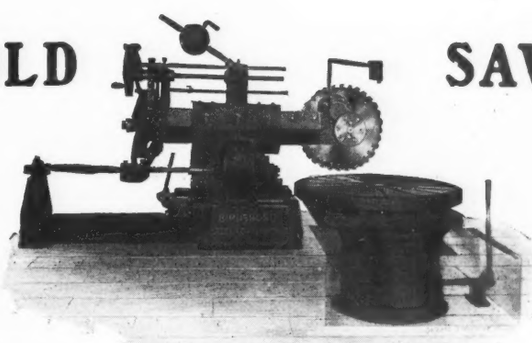

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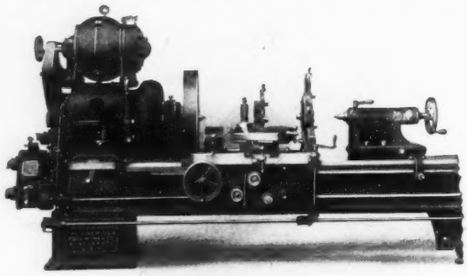

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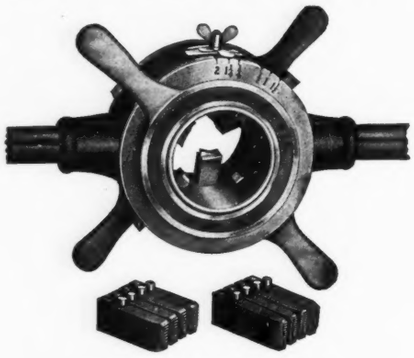

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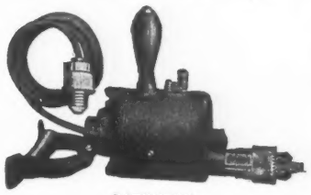

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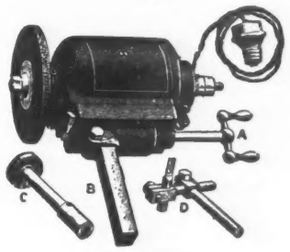

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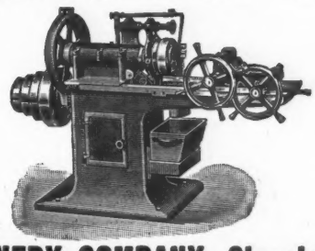

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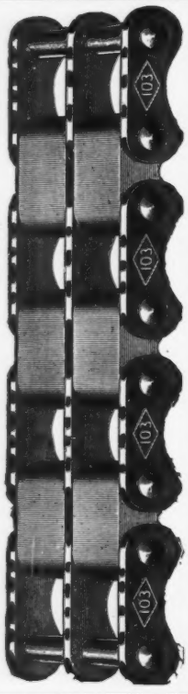

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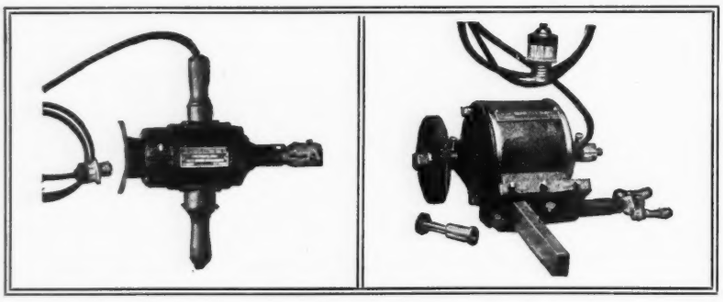

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Stow Flexible Shaft Co., Philadelphia, Pa.

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Hendey Mch. Co., Torrington, Conn.
Ingersoll Milling Mch. Co., Rockford, Ill.
Kearney & Trecker, Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. Le Blond Mch. Tool Co., Cincinnati, O.
Newton Mch. Tool Wks., Philadelphia, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Hartford, Conn.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Waltham Watch Tool Co., Springfield, Mass.
Whitney Mfg. Co., Hartford, Conn.

Milling Cutters.
Becker-Brainard Milling Mch. Co., Hyde Park.
Boker, Hermann, & Co., New York and Chicago.
Boston Gear Works, Boston, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Garvin Mch. Co., New York.
Morse Twist Drill & Mch. Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Standard Tool Co., Cleveland, O.
L. S. Starrett Co., Athol, Mass.
Union Twist Drill Co., Athol, Mass.

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Classified Index to Advts. (Continued).

Milling Tools (Hollow Adjustable).
Geometric Tool Co., New Haven, Conn.

Molding Machines.
S. Obermayer Co., Cincinnati, O.

Motors.
Steffey Mfg. Co., Philadelphia, Pa.

Motors (Electric).
Bell Elec. & Mfg. Co., New York.
Crocker-Wheeler Co., Ampere, N. J.
Eck Dynamo & Motor Wks., Belleville, N. J.
General Electric Co., Schenectady, N. Y.
Guarantee Electric Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
Robbins & Myers Co., Springfield, O.
Sprague Elec. Co., New York.
Sterling Elec. Motor Co., Dayton, O.
B. F. Sturtevant Co., Hyde Park, Mass.
Western Electric Co., Chicago, Ill.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

Name Plates.
Turner Brass Works, Chicago, Ill.

Nozzles.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Nut Tappers.
Acme Mchy. Co., Cleveland, O.
National Mchy. Co., Tiffin, O.
Pratt & Whitney Co., Hartford, Conn.

Oil Cans.
Delphos Can Co., Delphos, O.

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W. M. & C. F. Tucker, Hartford, Conn.
Winkley Co., Detroit, Mich.

Oil Hole Covers.
Bay State Stamping Co., Worcester, Mass.
W. M. & C. F. Tucker, Hartford, Conn.
Winkley Co., Detroit, Mich.

Oilless Bearings.
Arguto Oilless Bearing Co., Philadelphia, Pa.

Oil Stones.
Norton Co., Worcester, Mass.
Star Corundum Wheel Co., Ltd., Detroit, Mich.

Packing.
Jenkins Bros., New York.
New York Belting and Packing Co., New York.

Patterns, Wood and Metal.
Moline Tool Co., Moline, Ill.
Penn Pattern Wks., Chester, Pa.

Pattern Letters.
Butler, A. G., New York.

Patents.
Burnham, Royal E., Washington, D. C.
Coombs, H. A., Washington, D. C.
Gardner Eng'r'g Co., New York.
Howson & Howson, Philadelphia, Pa.
Shepherd & Parker, Washington, D. C.
Stevens, Milo B., & Co., Washington, D. C.
Whittlesey, Geo. P., Washington, D. C.

Pattern Shop Equipment.
Colburn Mch. Tool Co., Franklin, Pa.
Fox Machine Co., Grand Rapids, Mich.

Phosphorizers.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Pipe-Cutting and Threading Tools.
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Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Curtis & Curtis Co., Bridgeport, Conn.
Hart Mfg. Co., Cleveland, O.
Merrell Mfg. Co., Toledo, O.
Pratt & Whitney Co., Hartford, Conn.
D. Saunders' Sons, Yonkers, N. Y.
Standard Engineering Co., Ellwood City, Pa.
Stoever Fdry. & Mfg. Co., Myerstown, Pa.
Trimont Mfg. Co., Roxbury, Mass.
Williams Tool Co., Erie, Pa.

Planers, Metal.
American Tool Wks. Co., Cincinnati, O.
Betts Mch. Co., Wilmington, Del.
Cincinnati Planer Co., Cincinnati, O.
Cleveland Planer Wks., Cleveland, O.
Detrick & Harvey Mch. Co., Baltimore, Md.
Flather, Mark, Planer Co., Nashua, N. H.
Gleason Works, Rochester, N. Y.
G. A. Gray Co., Cincinnati, O.
Hamilton Mch. Tool Co., Hamilton, O.
Morton Mfg. Co., Muskegon Heights, Mich.
New Haven Mfg. Co., New Haven, Conn.
Niles-Bement-Pond Co., New York.
Ohio Mch. Tool Co., Kenton, O.
Pratt & Whitney Co., Hartford, Conn.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Whitcomb-Blaisdell Mch. Tool Co., Worcester.
W. A. Wilson Mch. Co., Rochester, N. Y.

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Paxson, J. W., & Co., Philadelphia, Pa.

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General Pneu. Tool Co., Montour Falls, N. Y.
Ingersoll-Rand Co., New York.
Manning, Maxwell & Moore, Inc., New York.

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Hamilton Mch. Tool Co., Hamilton, O.
Hoefer Mfg. Co., Freeport, Ill.
Lucas Mch. Tool Co., Cleveland, O.
Miner & Peck Mfg. Co., New Haven, Conn.
Niles-Bement-Pond Co., New York.
Springfield Mch. Tool Co., Springfield, O.
Toledo Mch. & Tool Co., Toledo, O.
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Watson-Stillman Co., New York.

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Yale & Towne Mfg. Co., New York.

Pulleys.
American Pulley Co., Philadelphia, Pa.
Jeffrey Mfg. Co., Columbus, O.
Poole Eng'rg & Mch. Co., Baltimore, Md.

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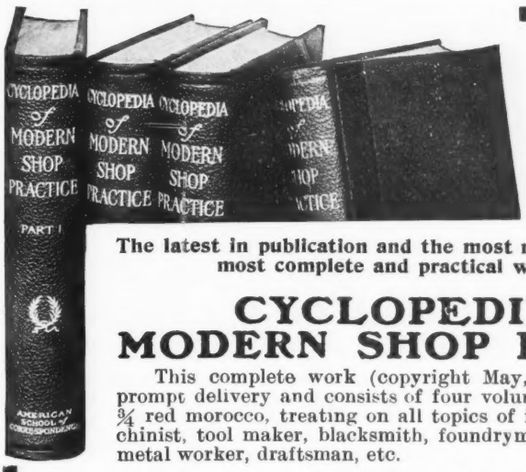

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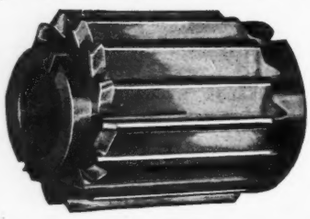

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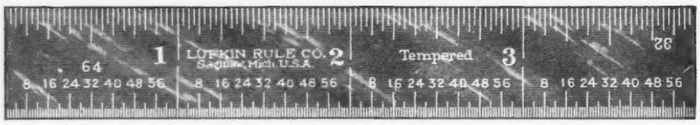

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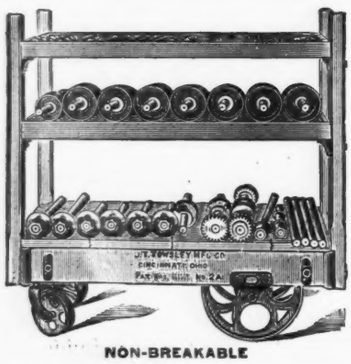

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Cincinnati Punch & Shear Co., Cincinnati, O.
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New Doty Mfg. Co., Janesville, Wis.
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Toledo Mch. & Tool Co., Toledo, O.
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Watson-Stillman Co., New York.

Pyrometers.
Englehard, Chas., New York.

Quartz Glass Articles.
Englehard, Chas., New York.

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Milwaukee Fdry. Supply Co., Milwaukee, Wis.

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Pratt & Whitney Co., Hartford, Conn.
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Schellenbach & Darling Tool Co., Cincinnati, O.
Standard Tool Co., Cleveland, O.
Three Rivers Tool Co., Three Rivers, Mich.
Union Twist Drill Co., Athol, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Reamers, Adjustable.
Pratt & Whitney Co., Hartford, Conn.
Rogers, John M., Works, Gloucester City, N. Y.

Reamers, Pneumatic.
Stow Flexible Shaft Co., Philadelphia, Pa.

Rivet and Spike Machinery.
National Mchy. Co., Tiffin, O.

Riveters.
Chambersburg Engineering Co., Chambersburg, Pa.
General Pneumatic Tool Co., Montour Falls, N. Y.
Ingersoll-Rand Co., New York.
Niles-Bement-Pond Co., New York.
Wm. Sellers & Co., Inc., Philadelphia, Pa.
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Auburn Ball Bearing Co., Rochester, N. Y.
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Crescent Mch. Co., Leetonia, O.
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Potter & Johnston Mch. Co., Pawtucket, R. I.
Pratt & Whitney Co., Hartford, Conn.
Queen City Mch. Tool Co., Cincinnati, O.

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Rhodes, L. E., Hartford, Conn.
Rockford Mch. Tool Co., Rockford, Ill.
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Smith & Mills, Cincinnati, O.
Springfield Mch. Tool Co., Springfield, O.
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Sellers, Wm. & Co., Inc., Philadelphia, Pa.

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Dalin Bros., Rockford, Ill.
Garvin Mch. Co., New York.
Niles-Bement-Pond Co., New York.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
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Pratt & Whitney Co., Hartford, Conn.
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Perry Time Stamp Co., Chicago, Ill.

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Pratt & Whitney Co., Hartford, Conn.

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Billings & Spencer Co., Hartford, Conn.
Bown Mch. Co., Ltd., Battle Creek, Mich.
Elgin Tool Works, Elgin, Ill.
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Western Tool and Mfg. Co., Springfield, O.

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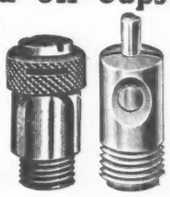

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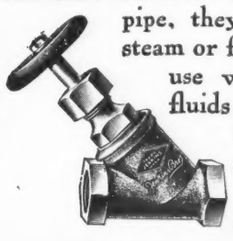

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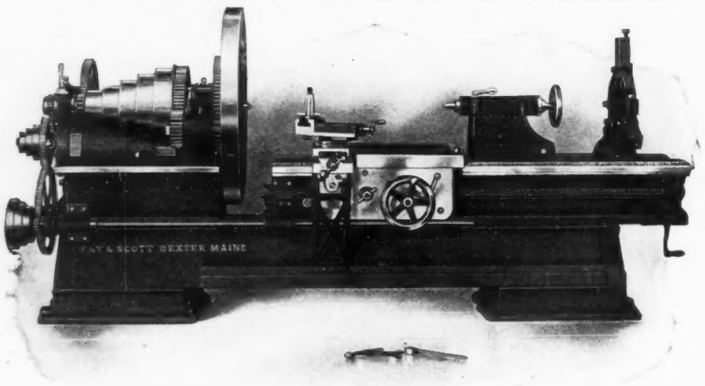

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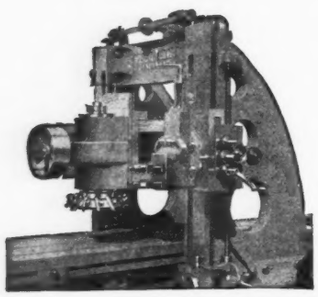

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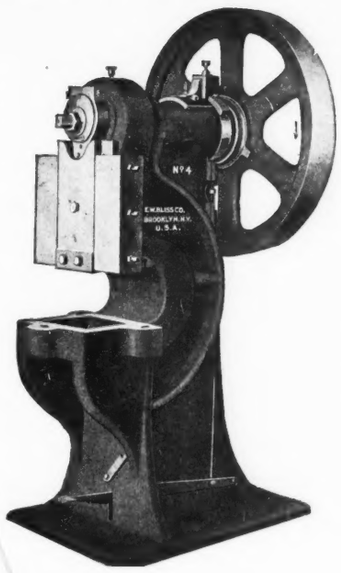

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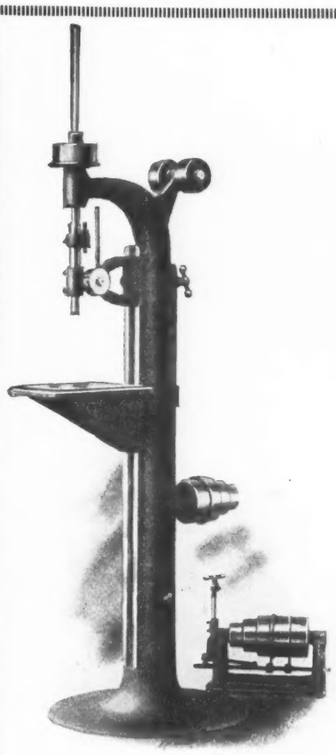

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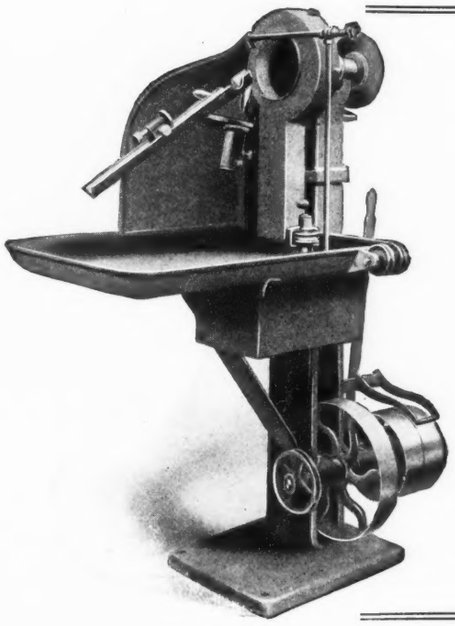

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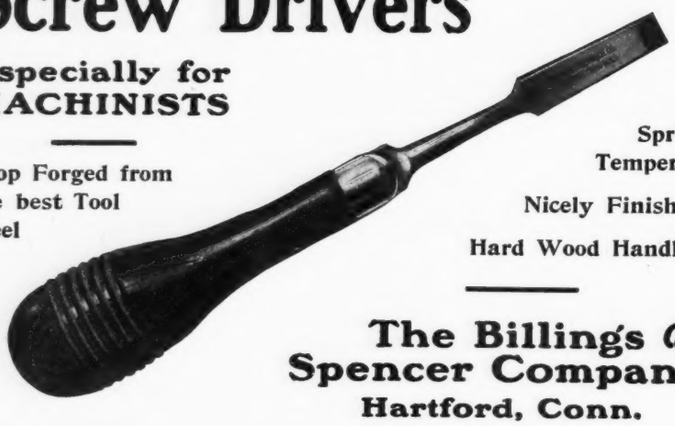

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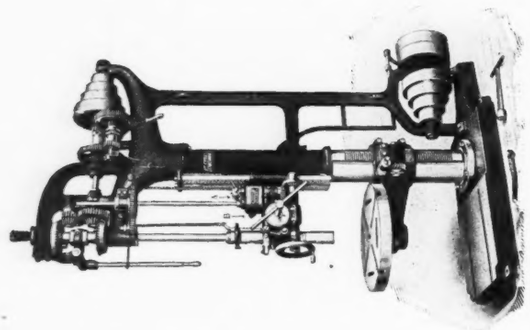

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Cover the construction of the Geared Tapping Attachment on Upright Drilling Machines as shown herewith.

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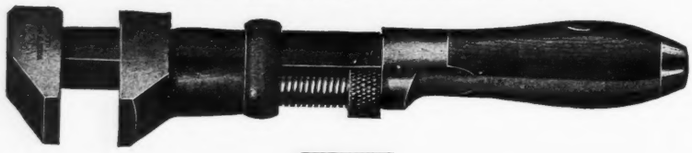

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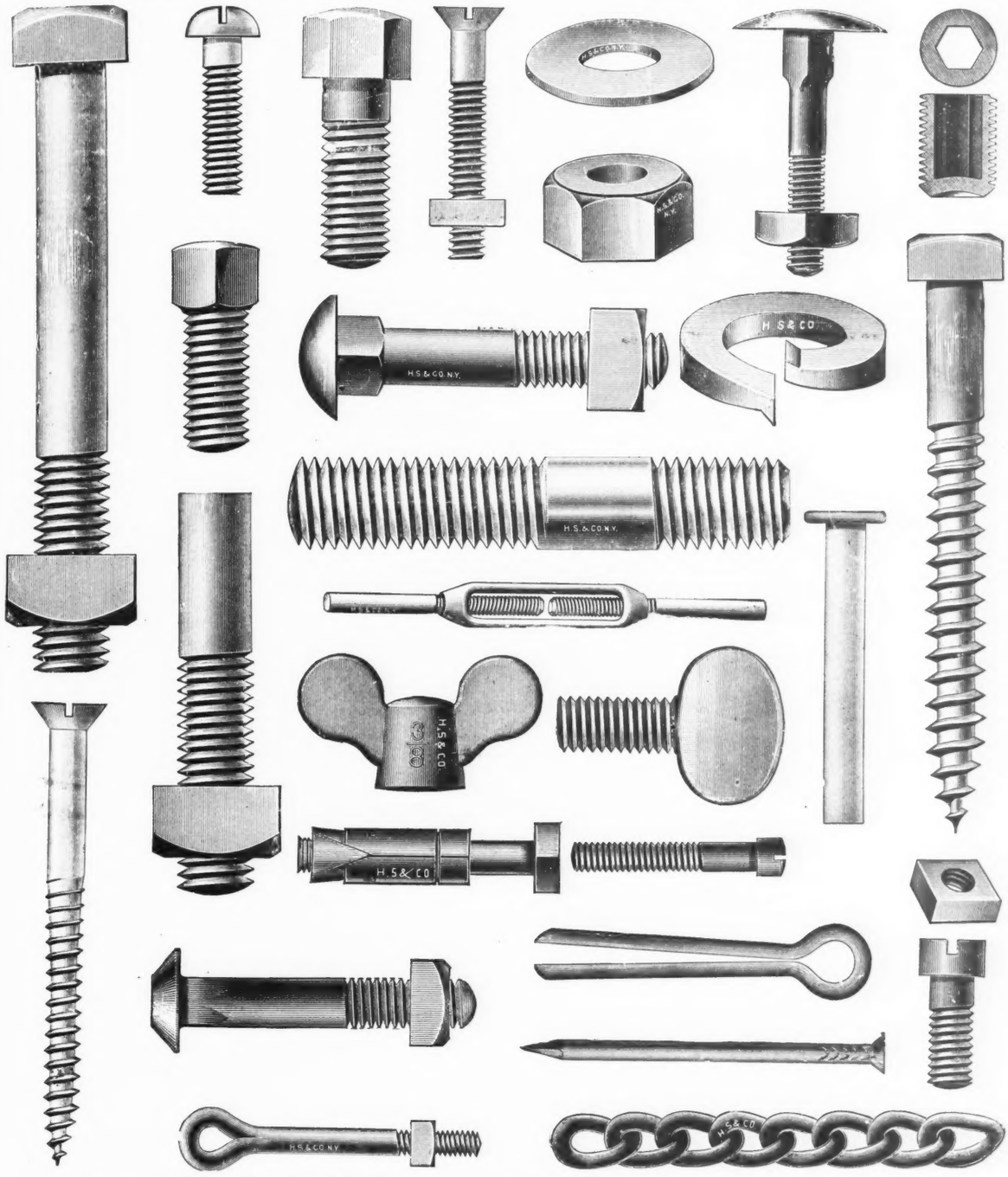

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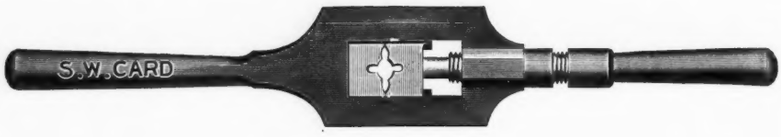

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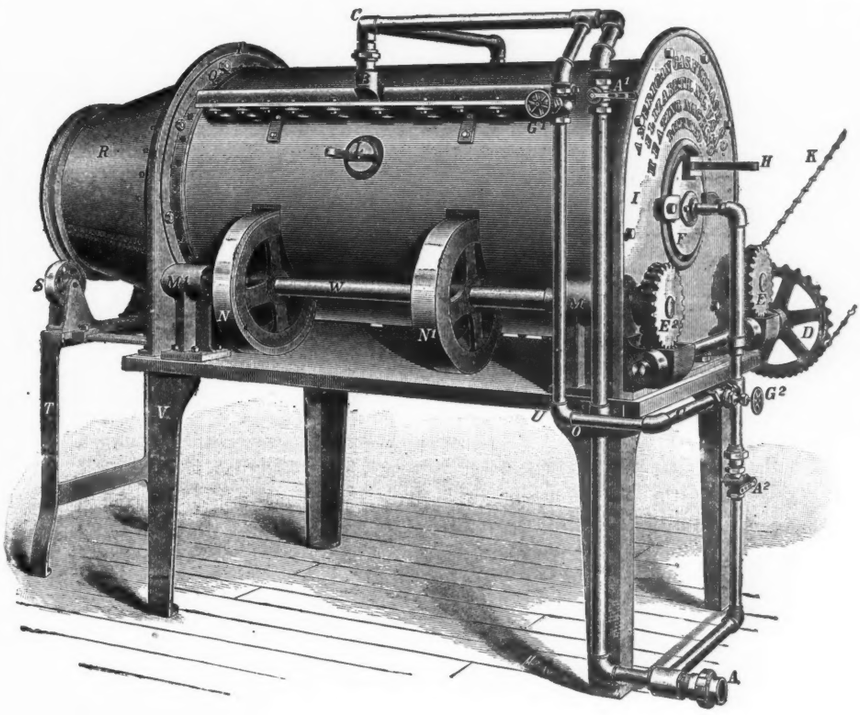

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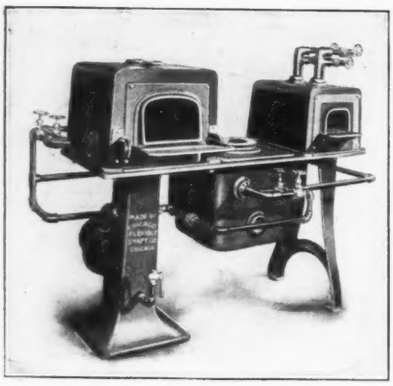

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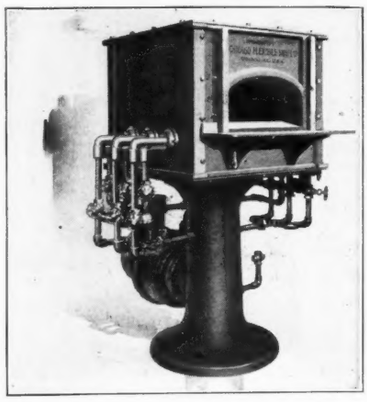

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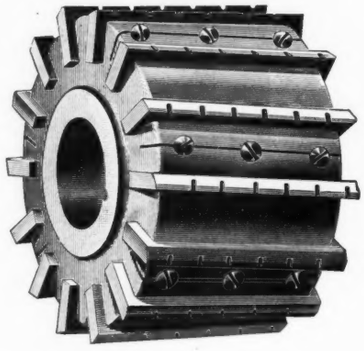

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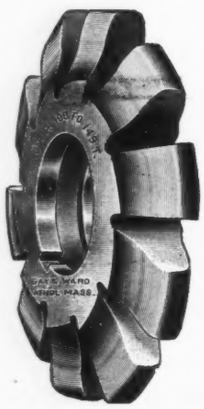

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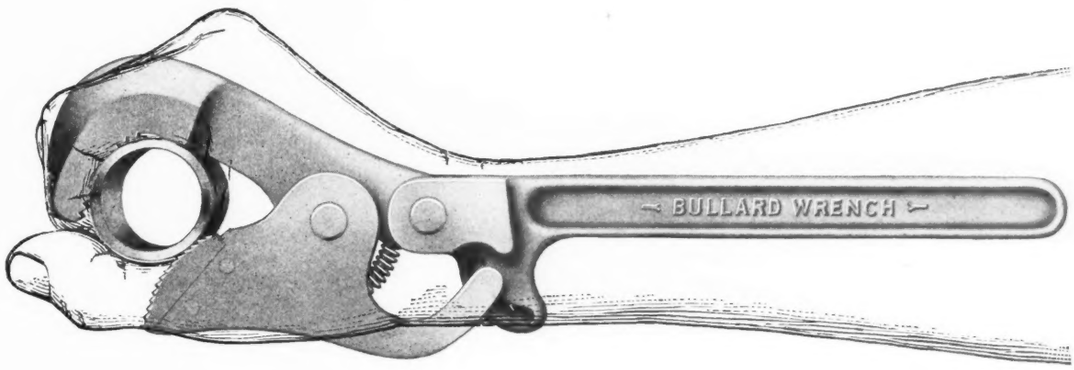

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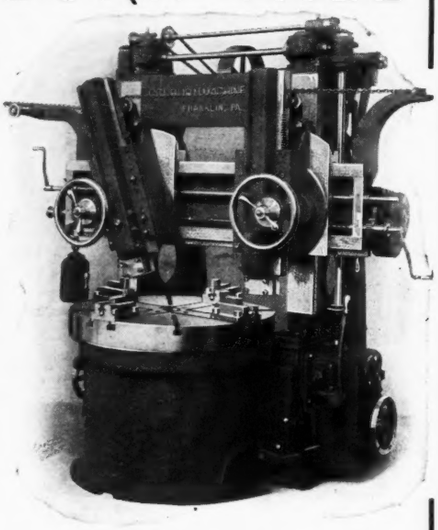

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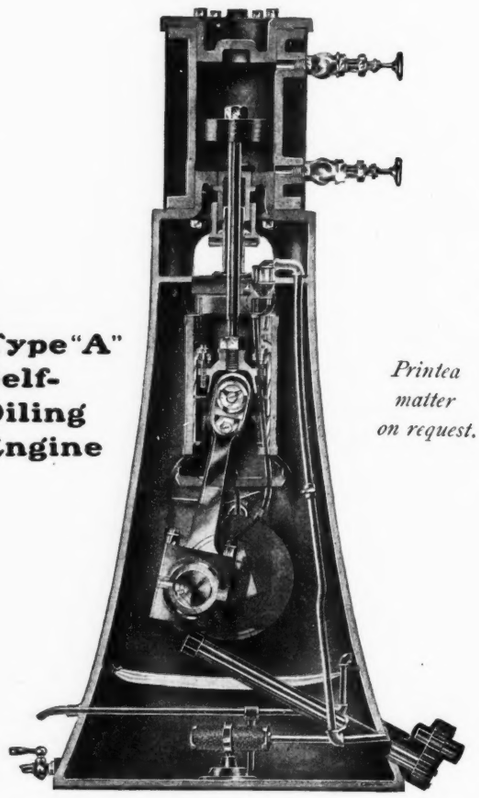

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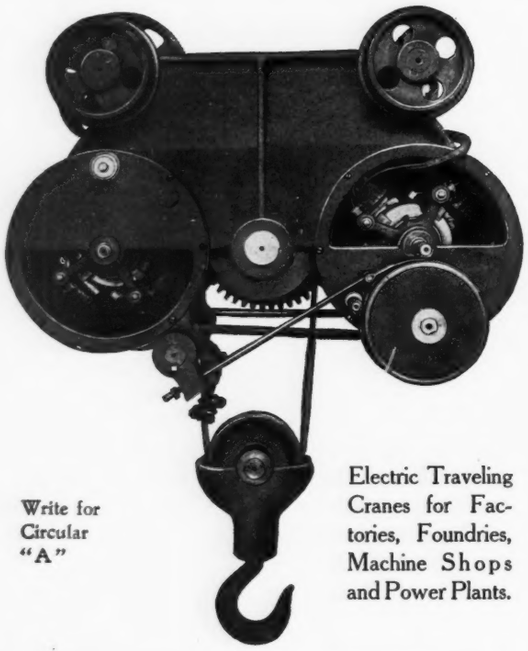

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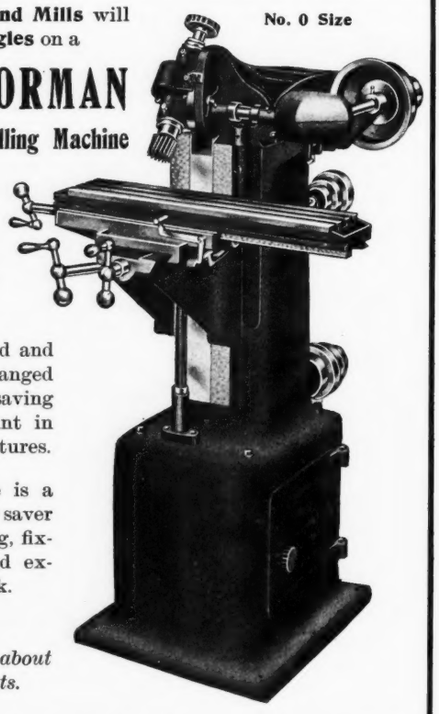

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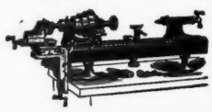

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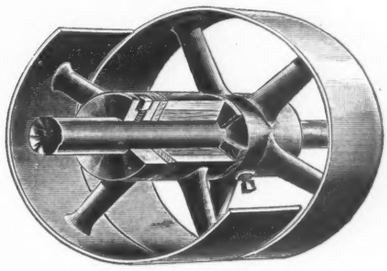


Loose Pulley Equipment

Arguto Oilless Bearings are not very large but they do more good to the square inch in their own field of usefulness than anything you can mention.

The loose pulleys and friction clutches fitted with Arguto Bearings run smoothly, quietly and continuously without any attention. Why? Because "Arguto" cuts out the lubrication problem. Oil and rapid running pulleys never stay long in company—and trouble follows the parting. With Arguto Bearings there is no further need of oil or oiling, there are no spattered walls or floors, no lost time. They prolong the life of your belts from 40 to 50 per cent., save labor, trouble and wear indefinitely. *6 to 8 years, without being oiled—where heretofore the Pulleys required attention every 6 to 8 hours—is an item.* If interested, send for catalogue and testimonials.

Arguto Oilless Bearing Co., Wayne Junction, Philadelphia, Pa.

Four very good reasons why you should install a Gear Shaper

FIRST—It will cut 25 to 50 per cent. more gears than any other machine.
(How long would it require to pay for a machine at that rate? Is it important that you get out more work in these busy times?)

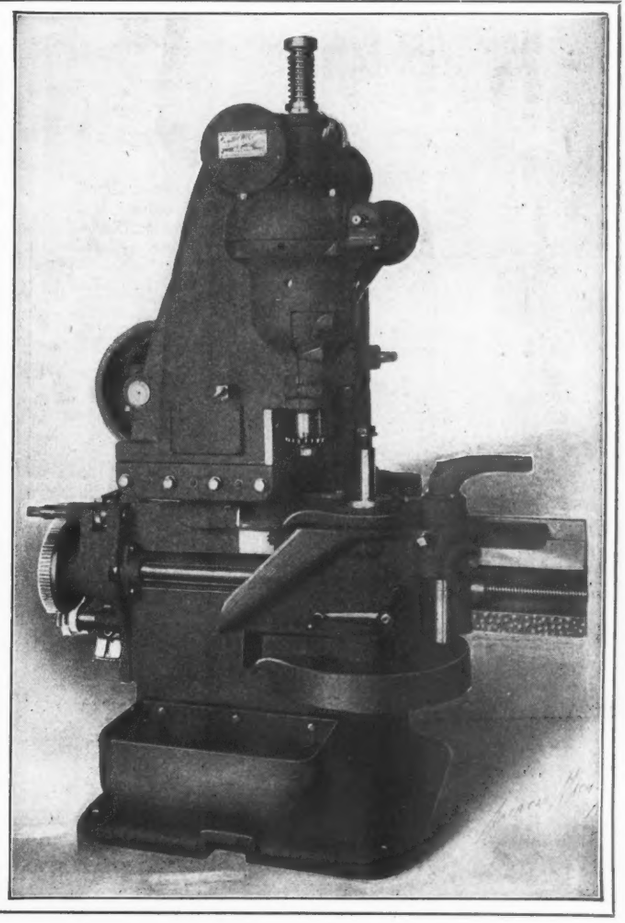
SECOND—It will cut smoother running gears than any other machine, because the cutter is not only theoretically correct, but all distortion is ground away after it is hardened.
(Absence of noise and minimum of power are important features in gearing.)

THIRD—It handles to advantage a large variety of work not possible, or at least not practicable, on any other machine.
(This is because of the planing cutter, which makes it possible to plane up to a shoulder or into a narrow recess, cluster and internal gears being examples.)

FOURTH—It is durable under the most exacting conditions; simple, being the nearest to an automatic machine of any gear cutter, and thoroughly practicable in every detail.

Scores of pleased customers testify to the above. Ask for a list of unprejudiced users, and send prints for cutting time.

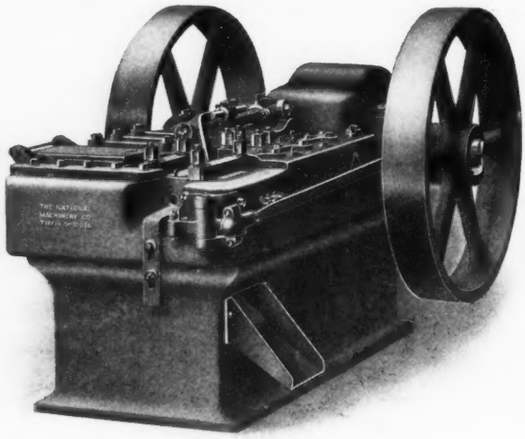
Remember our gear cutting department.



The Fellows Gear Shaper Co.

25 Pearl Street, SPRINGFIELD, VT., U. S. A.

FOREIGN AGENTS—Henry Kelley & Co., Manchester, England. M. Koyemann, Dusseldorf, Germany. Ph. Bonvillain and E. Ronceray, Paris, France. White, Child & Beney, Vienna, Austria. Walter S. Stone & Co., Yokohama, Japan. The C. & J. W. Gardner Co., St. Petersburg, Russia.



The National Rivet and Track Bolt Header

A gripping action that positively will not allow the grip dies to "give" during the upset.

A gripping action that obviates the necessity of setting dies to "overgrip" to secure the desired pressure on work.

A relief action that fully protects the machine and yet cannot operate at that time when it is important that a relief *should not* operate, i.e.—while head is being made.

A completeness of design and a standard of material and workmanship not to be found elsewhere in such equipment.

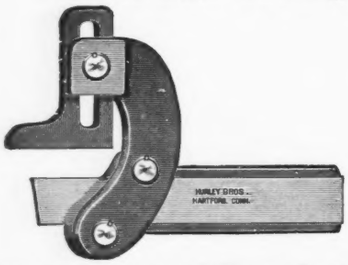
This new tool bids fair to soon become the standard rivet header.

ALSO
Bolt Heading Machines
Forging Machines
Bolt Cutters (25 sizes and styles)
Hot Pressed Nut Machines
Nut Tappers
Washer Machines
Bulldozers
Wire Nail Machines

THE NATIONAL MACHINERY CO. TIFFIN, OHIO, U.S.A.

FOREIGN AGENTS:
Fenwick, Freres & Co., Paris, Brussels, Liege.
Buck & Hickman, Ltd., London, Birmingham, Manchester, Glasgow.
De Fries & Co., Berlin, Dusseldorf.
Takata & Co., Tokio.

H. B. Pat. Cutting-off Tool.

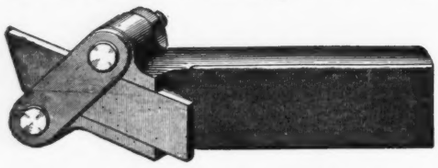


Something New and Good.

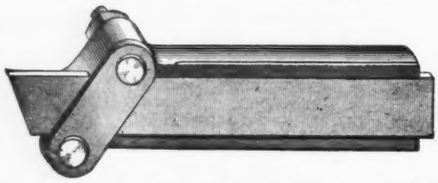
Brass or Steel foot rests. Uses regular Slate Blades. Shank same as Slate No. 2.

Slate No. 2 Offset Cutting-off Tool.

Shank $1\frac{1}{16}$x$\frac{1}{2}$".



Slate No. 2 Cutting-off Tool.



Shank $1\frac{1}{16}$x$\frac{1}{2}$". Blades $\frac{1}{16}$ to $\frac{1}{4}$" by 16ths. Special sizes by 1000ths made to order.

Also **Crescent Cutting-off Tools.** Straight shanks, no projections, for screw machine use. No. 2, $1\frac{1}{4}$x$\frac{1}{2}$". No. 3, $1\frac{7}{16}$x$\frac{5}{8}$" shank. No. 2 blades $\frac{7}{8}$" wide. No. 3, 1" wide, all thicknesses. For sale by supply dealers, or

Dwight Slate Machine Company
HARTFORD, CONN.

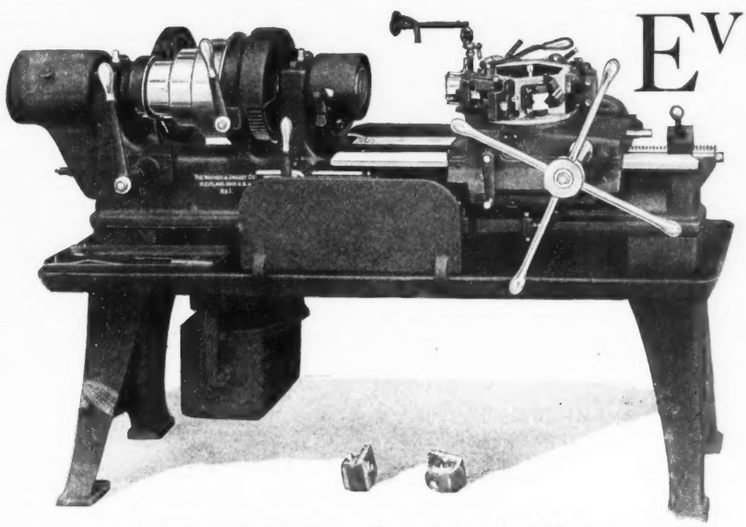
New No. 7 Sawyer Level

with patent ground glasses

Simple and positive adjustments. Nicely finished. Made to satisfy the requirements of the most exacting mechanics in all lines of mechanical work. A very high grade level at a moderate cost. Our catalogue gives further description. Also shows our complete line. Send for it.

Sawyer Tool Mfg. Co.

71 Winter St., Fitchburg, Mass.



No. 1—1¼ x 18 inches. Other sizes:—No. 2, 2¼ x 24 and No. 3, 3 x 36 inches.

EVERY SIZE MOST ECONOMICAL for work strictly within its range

No. 1 Hollow Hexgaon Turret Lathe, here illustrated, for small work—1½" diameter and smaller in lengths up to 18"—greatest rapidity and ease in operation—GREATEST OUTPUT.

Larger machines for larger work.

THE WARNER & SWASEY CO.,

CLEVELAND, OHIO, U. S. A.

Turret Lathes and Brass-Working Machine Tools.

FOREIGN AGENTS—Chas. Churchill & Co., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Schuchardt & Schutte, Berlin, Vienna, St. Petersburg and Stockholm. Alfred H. Schutte, Cologne, Paris, Brussels and Milan. H. W. Petrie, Toronto. Williams & Wilson, Montreal.

A Subject for Reflection

This is a reproduction from a photograph of a gas engine valve made from the new "MONEL METAL." It is bright as a mirror, as the reflection of the section of screw in the face of the valve makes plain—and it stays bright. The fact that this metal is NON-CORROSIVE especially adapts it for gasoline and automobile motor valves, and is a feature that should be carefully considered by builders of gas or gasoline engines.

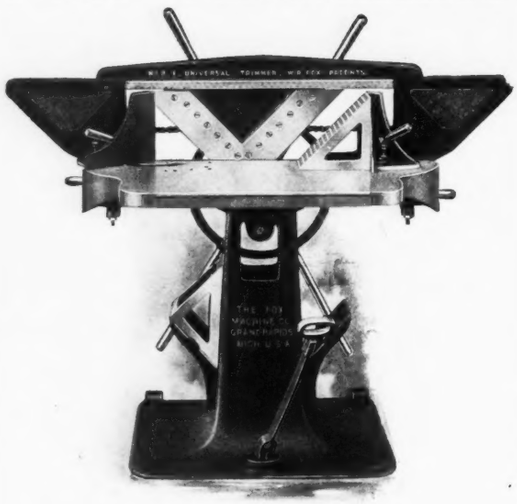
"MONEL METAL"

is a natural alloy of nickel and copper and has superior advantages which we shall be glad to explain more fully on request.

A. P. Witteman & Co., 1223-1225 Spring Street, Philadelphia, Pa.

Eastern Selling Agents: Burgess High Speed Steels, Burgess Tool Steels and Cyclops Steels.

FOX TRIMMERS



HERE'S A NEW ONE
GET BULLETIN 49

FOX MACHINE CO.
815-825 N. Front St., Grand Rapids, Mich.
COMPLETE PATTERN SHOP EQUIPMENTS

The Electric Controller & Supply Co.

DINKEY VENTILATED CONTROLLERS FOR

Severe service under the most exacting conditions

EXCEL ALL OTHERS

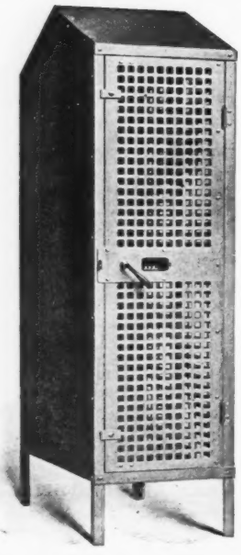
They are built from 1 to 100 H.P. with cast grid or coil resistance, with top lever or with under lever when it is desired to mount the controller at the rear or above the operator.

THEY WILL MEET YOUR CONDITIONS

SPECIFY THEM

Send for Bulletin No. 102

The Electric Controller & Supply Co.
CLEVELAND, OHIO



The Better Locker

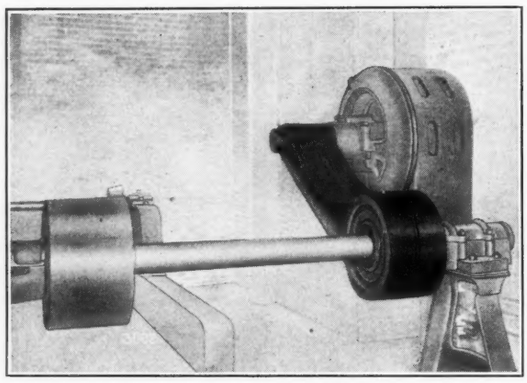
for the factory, office, store, institution — for every place a locker is needed —is the

Hart & Cooley Wrought Steel Locker.

Built on the unit system, they can be adapted to any space. Made of wrought steel perforated stock they are absolutely sanitary and can be cleaned with ease. Fitted with the latest improved hooks, round edged shelves and patent safety locking device.

We make a wide range of styles and sizes.
May we send our booklet?

The Hart & Cooley Co.
New Britain, Conn.



75 H. P. Parallel Silent Chain drive operating Pusey & Jones Paper Machines at Paper Mill of York Haven Paper Co., York Haven, Pa.

The superintendent of the mill reports:

"This Renold Silent Chain Equipment has increased the production over 15%."

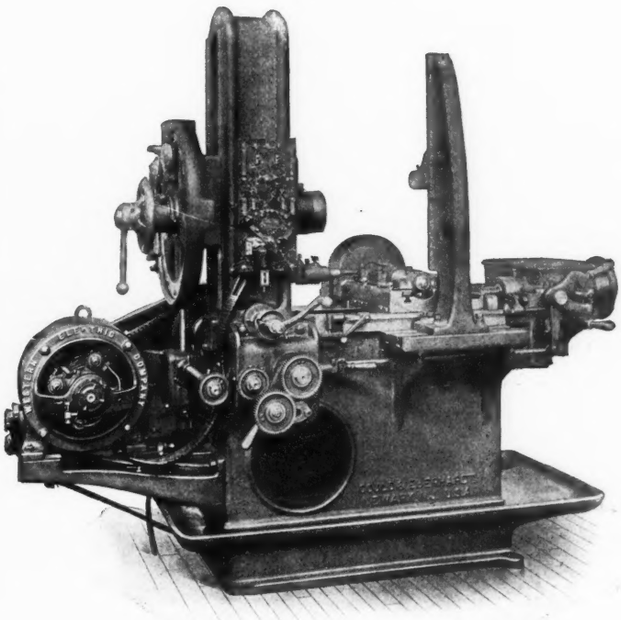
Not a theoretical claim for the superiority of Renold Silent Chain, but a fact proven by actual experience. There is an application of it to your business.

Write for Booklet "Y" and Special Bulletins 50, 52 and 58.

Philadelphia **THE LINK-BELT ENGINEERING CO.** Philadelphia

New York 49 Dey Street | Pittsburgh Park Building | Boston 164 Federal Street

Chicago **THE LINK-BELT MACHINERY CO.** Chicago



Peculiarities of Machine Tools

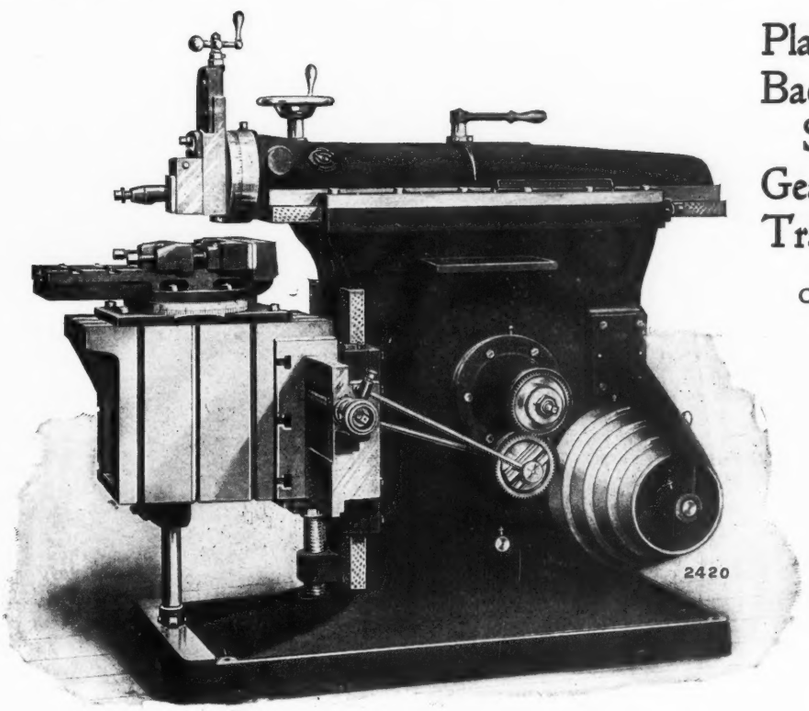
require that motors for their operation, be designed for that purpose. Our type "E" motor, which has operated so successfully, will withstand wide variations of load without sparking or overheating. The motor permits of heavy overloads without injury.

Write our nearest house for a copy of Bulletin 12-D.

Western Electric Company

Chicago **New York** **Saint Paul** **Philadelphia**
Saint Louis **San Francisco** **Cincinnati**
Denver **Kansas City** **Pittsburg** **Los Angeles** **Seattle**

HEAVY DUTY SHAPERS



24-inch Back Geared Crank Shaper.

Plain Crank Shapers
Back Geared Crank Shapers
Geared Rack Shapers
Traverse Shapers

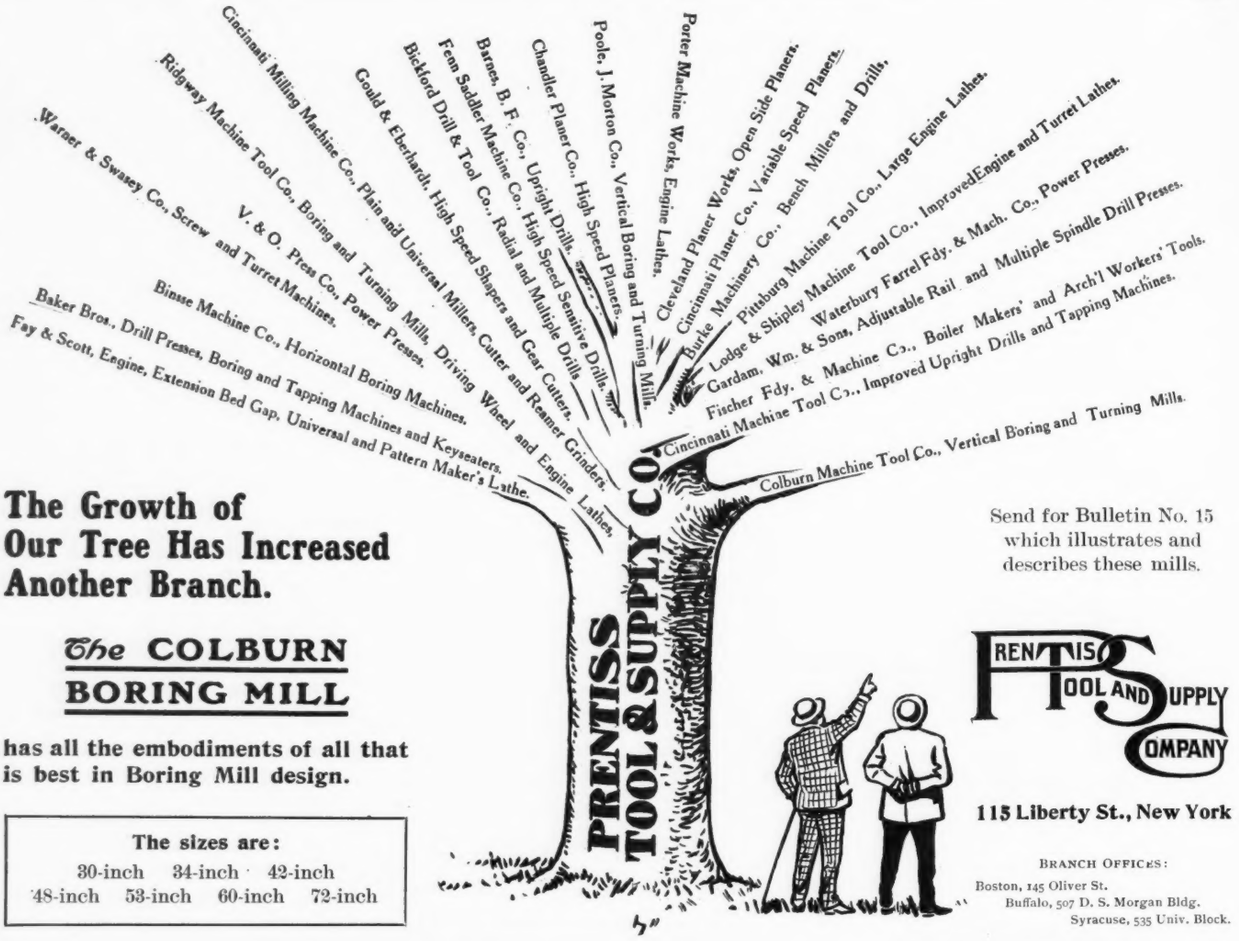
CATALOGUE ON REQUEST

The Cincinnati Shaper Company

Garrard Ave. and Elam St.
CINCINNATI, OHIO

The Largest Exclusive Manufacturers of Shapers

AGENTS—Manning, Maxwell & Moore, Inc., New York, Chicago, Boston, St. Louis, Cleveland; Brown & Zortman Mchy. Co., Pittsburg; W. E. Shipley, Philadelphia; The National Supply Co., Toledo, O.; C. W. Burton, Griffiths & Co., London; A. H. Schutte, Brussels, Cologne, Liege, Milan, Bilbao, Paris; Schuchardt & Schutte, St. Petersburg, Vienna, Berlin, Stockholm; H. W. Petrie, Toronto.


Porter Machine Works, Engine Lathes.
Poole, J. Morton Co., Vertical Boring and Turning Mills.
Chandler Planer Co., High Speed Planers.
Barnes, B. F. Co., Upright Drills.
Fenn Saddler Machine Co., High Speed Sensitive Drills.
Bickford Drill & Tool Co., Radial and Multiple Drills.
Could & Eberhardt, High Speed Shapers and Gear Cutters.
Cincinnati Milling Machine Co., Plain and Universal Millers, Cutter and Reamer Grinders.
Ridgway Machine Tool Co., Boring and Turning Mills, Driving Wheel and Engine Lathes.
Warner & Swasey Co., Screw and Turret Machines.
V. & O. Press Co., Power Presses.
Binsse Machine Co., Horizontal Boring Machines.
Baker Bros., Drill Presses, Boring and Tapping Machines and Keyseaters.
Fay & Scott, Engine, Extension Bed Gap, Universal and Pattern Maker's Lathe.
Cleveland Planer Works, Open Side Planers.
Cincinnati Planer Co., Variable Speed Planers.
Burke Machinery Co., Bench Millers and Drills.
Pittsburg Machine Tool Co., Large Engine Lathes.
Lodge & Shipley Machine Tool Co., Improved Engine and Turret Lathes.
Waterbury Farrel Fdy. & Mach. Co., Power Presses.
Gardam, Wm. & Sons, Adjustable Rail and Multiple Spindle Drill Presses.
Fischer Fdy. & Machine Co., Boiler Makers' and Arch'l Workers' Tools.
Cincinnati Machine Tool Co., Improved Upright Drills and Tapping Machines.
Colburn Machine Tool Co., Vertical Boring and Turning Mills.
PRENTISS TOOL & SUPPLY CO.

The Growth of Our Tree Has Increased Another Branch.

The COLBURN BORING MILL

has all the embodiments of all that is best in Boring Mill design.

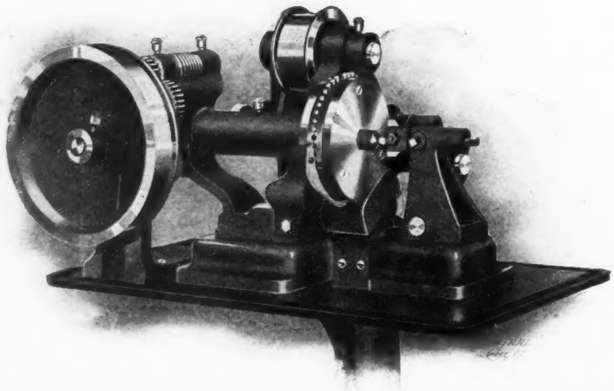
The sizes are:
30-inch 34-inch 42-inch
48-inch 53-inch 60-inch 72-inch

Send for Bulletin No. 15 which illustrates and describes these mills.

PRENTISS TOOL AND SUPPLY COMPANY

115 Liberty St., New York

BRANCH OFFICES:
Boston, 145 Oliver St.
Buffalo, 507 D. S. Morgan Bldg.
Syracuse, 535 Univ. Block.



THE "ACME"

Semi-Automatic Screw Slotting Machine

is the most successful and economical for slotting headless, shoulder, hexagon, square, flat, round and special head screws, also irregular shapes within its capacity.

Speed limit is cutting capacity of the saw. Interchangeable discs for various sizes of screws.

SHIPMENT FROM STOCK

THE NATIONAL-ACME MFG. CO.
CLEVELAND, OHIO, U. S. A.

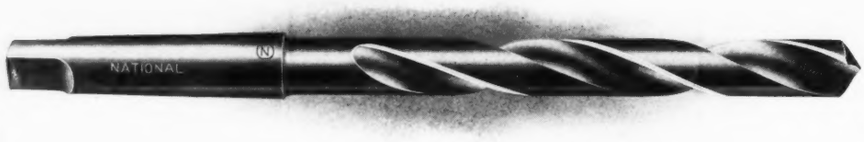
Branch Offices: NEW YORK BOSTON CHICAGO
Foreign Representatives: Schuchardt & Schutte. Alfred H. Schutte.

Are You Having Trouble

in your drilling department? If so write us about it, perhaps we can help you.

Drills, Reamers, Chucks.

A trial order will convince you of the superiority of National Drills.



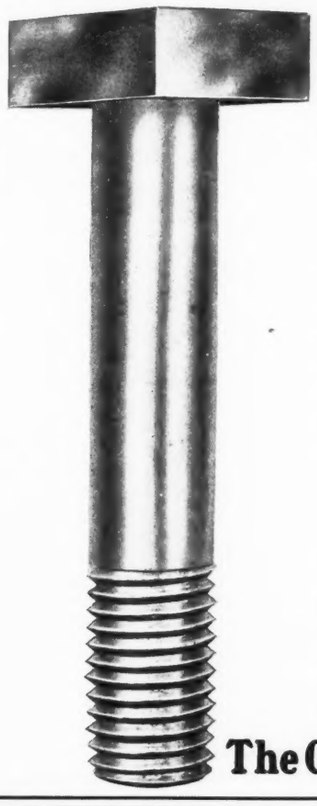
Special Tools.

Our improved method of tempering produces a tool of the first quality.

MANUFACTURED BY
The National Twist Drill & Tool Co.
DETROIT, MICH.

GENERAL SALES AGENTS
The Whitaker Manufacturing Co.
CHICAGO, ILL.

ENDORSEMENT



For those who have not bought

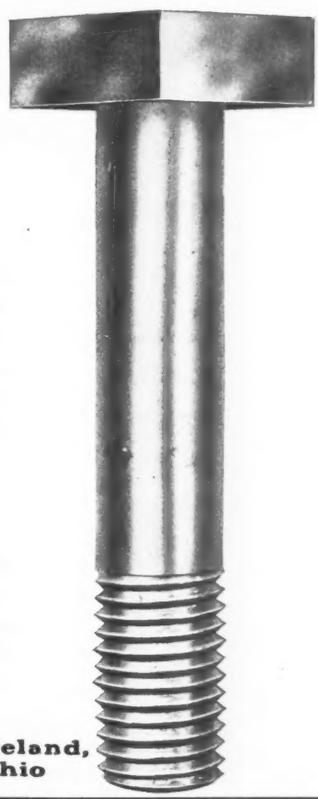
Our customers need no further endorsement than our large finished steel bolts and screws themselves—for their "come-back" orders testify their satisfaction and prove the quality.

A little while ago we sold a first order

To a prominent machinery manufacturer—the order was filled in the regular way and we asked afterwards, "How are the screws"? The reply was, "The screws you sent us were very satisfactory and we will proceed to send you another order in a few days".

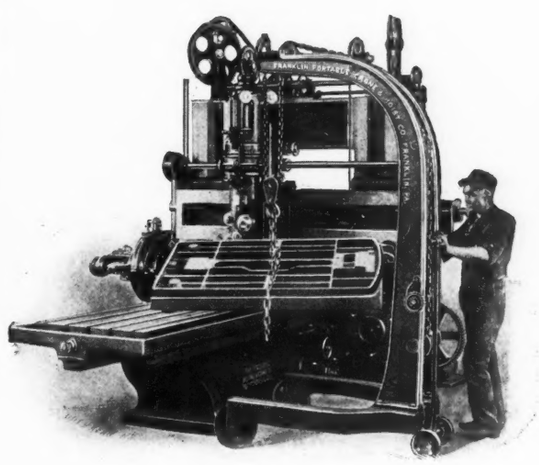
It came, and many others have followed

Why? Because in this case, as in many others we have either made an improvement in quality or reduced the cost. We can do the same for you, and filling your first order will prove it—will you go this far with us?



The Cleveland Cap Screw Co., Cleveland, Ohio

SERVING MACHINE TOOLS



Is one of the many uses to which a Franklin Portable Crane and Hoist can be put with advantage. Its lifting capacity—covering a range up to 4000 lbs.—and its perfect portability make the transportation of a heavy casting, or other piece of work, from a remote part of the shop to and unto the machine for finishing, a short and simple matter. One man can manage the whole job, too, for the Franklin is first and last a one man machine.

The Franklin Portable Crane and Hoist is a perfect combination of strength and utility: compact, durable, adaptable, and a necessity for the busy shop.

Ten Standard Sizes Carried in Stock. Write for Booklet and New Discount.

The Franklin Portable Crane and Hoist Company, Franklin, Pa.

Special Drop Forgings

Are you in need of Dies for something out-of-the-ordinary in this line? Write us about it. We have the equipment, the experience and the knowledge for such work—and can guarantee satisfaction. The right thing at the right price.

Send us your enquiries. Estimates furnished.

We are Specialists on Special Work

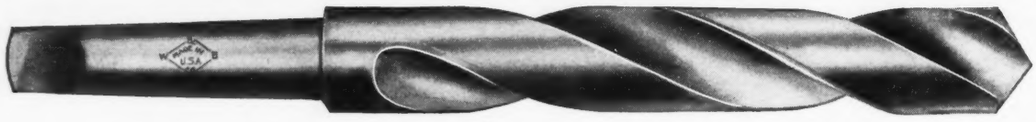
We can furnish Metal Stampings, Dies for Sheet Metal Articles of all kinds, special Drawn Steel or Brass Work, special Machine Parts—in fact we are prepared to manufacture special articles of every variety.

National Tool & Stamping Co.,

Wayne Junction, Philadelphia, Pa.

"DIAMOND" TWIST DRILLS

ALWAYS HIGHEST QUALITY



TRADE W&B MARK

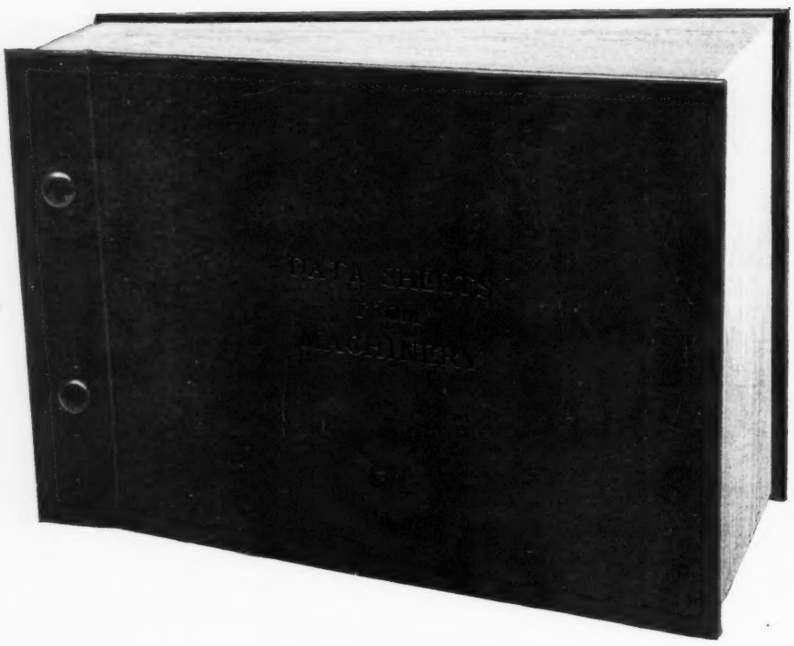
THE WHITMAN & BARNES MFG. CO.

Factories: Akron, O., Chicago, Ill, St. Catharines, Ont.

Stores and Warehouses: New York. N.Y., Boston, Mass., Cincinnati, O., Kansas City, Mo., London, Eng.

TRADE W&B MARK

Binder for MACHINERY'S Data Sheets



The Data Sheet Supplements issued with MACHINERY during the past four years comprise nearly 200 pages of mechanical tables, charts and diagrams especially valuable because the data represents actual practice—not theory.

Every one of these supplements has been reprinted in response to urgent demands, some of them twelve times, and if you haven't saved yours, you can get the complete set *now* under Offer No. 3.

This red cloth binder, gotten up in response to the wishes of hundreds of readers, is open back, measures 6¼x9¼ and costs only 35 cents delivered. It enables you to save the Supplements and to index them anyway you please.

The Industrial Press, 66-70 West Broadway, New York

"CLEVELAND" OPEN SIDE PLANER

Simplicity in construction is the aim of all good tool builders. The "Cleveland" is simplicity itself, and with this is coupled stiffness and rigidity, three essentials for a long lived tool. It does the work, it is accurate.

One user says in a letter just received:

"We are exceedingly pleased with the working of the planer, both as to the amount of power required to drive it, the ease, steadiness and quietness of the shifting and the high class of work it performs".

MANUFACTURED BY

THE CLEVELAND PLANER WORKS

3150-3158 SUPERIOR AVENUE, N. E.,

CLEVELAND, OHIO, U. S. A.

This machine is 48"x48"x16'. Made in all sizes from 30" to 72" in width and any length.

Uncle Sam Specifies the

ARMSTRONG TOOL HOLDERS

Because, to quote the exact words of a recent Government requisition,

"NO OTHERS WILL ANSWER THE NECESSITIES OF THE SERVICE."

Left Hand Off-Set Tool Holder. (11 sizes)

Straight Tool Holder. (11 sizes)

Boring Tool. (7 sizes)

Right Hand Off-Set Tool Holder. (11 sizes)

Planer Tool. (7 sizes)

Straight Cut-Off Tool. (7 sizes)

They make ONE LB. of High Speed Tool Steel worth 10 lbs. in forged Lathe and Planer Tools.

Armstrong Bros. Tool Co., 113 N. Francisco Ave., Chicago, U.S.A.

"The Tool Holder People"

Imitations are Unsatisfactory **Infringements are Unlawful**

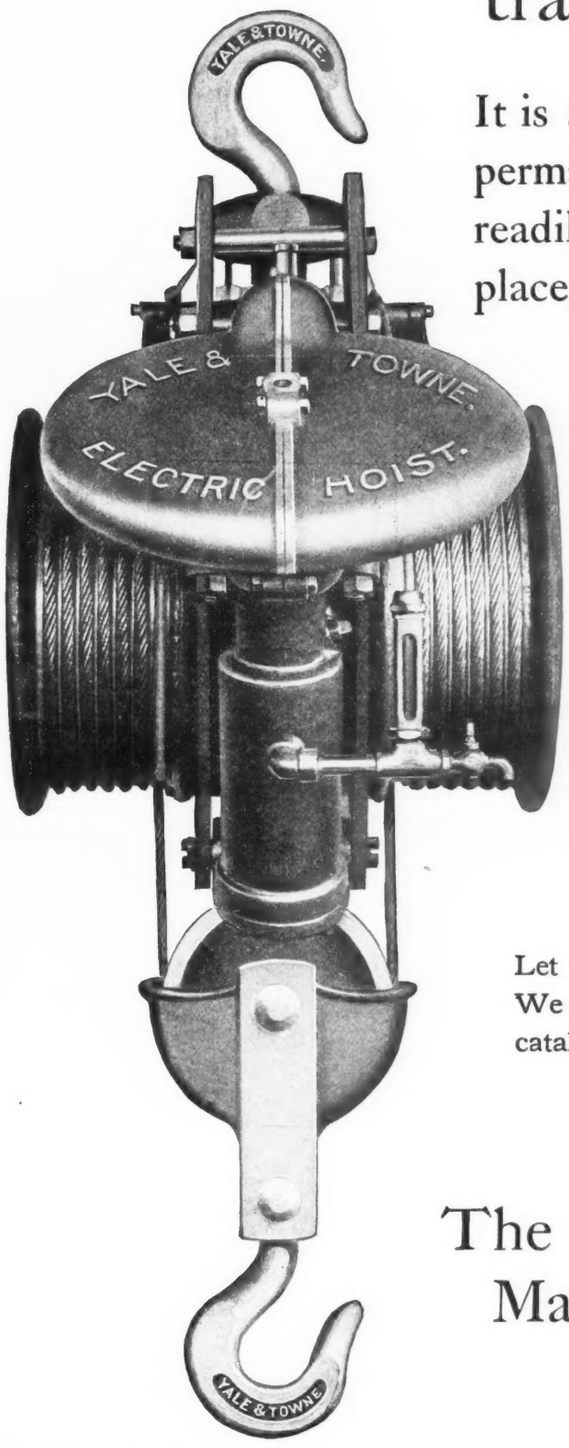
WRITE FOR CATALOG

"American Swiss" Files

THE demand for American Swiss Files has necessitated increased manufacturing facilities, and a new plant is now in course of construction. When completed we will be able to fill orders more promptly than is now possible, and will then make better use of this page.

E. P. Reichhelm & Co.
23 John Street, New York

The Yale & Towne Electric Hoist is a power hoist in concentrated form



It is self-contained, requires no permanent structure, can be readily moved from place to place, can be operated by any one of ordinary intelligence, and is in consequence

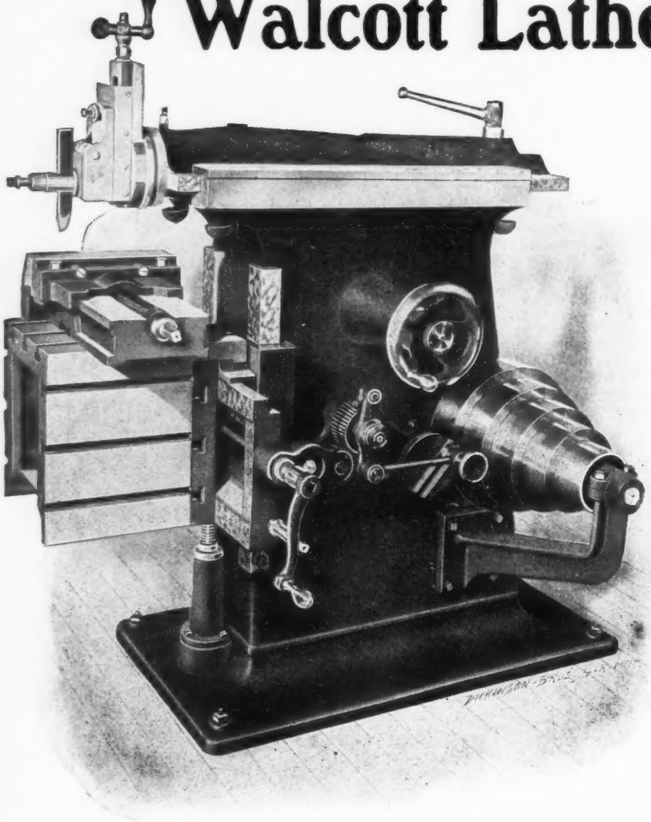
the most economical hoisting device in use and the most elastic in application.

Let us post you on its possibilities. We will be glad to send you our catalogue M.

The Yale & Towne Manufacturing Co.

9 Murray Street
New York

Walcott Lathes and Shapers



16-inch Back-geared Crank Shaper

The 16-in. Crank Shaper shown on this page, has self-adjusting feed mechanism, back gears, ten speed changes, quick return, stroke adjusted while running, and ample wearing surfaces. We also build the same style in 18 and 20″ sizes.

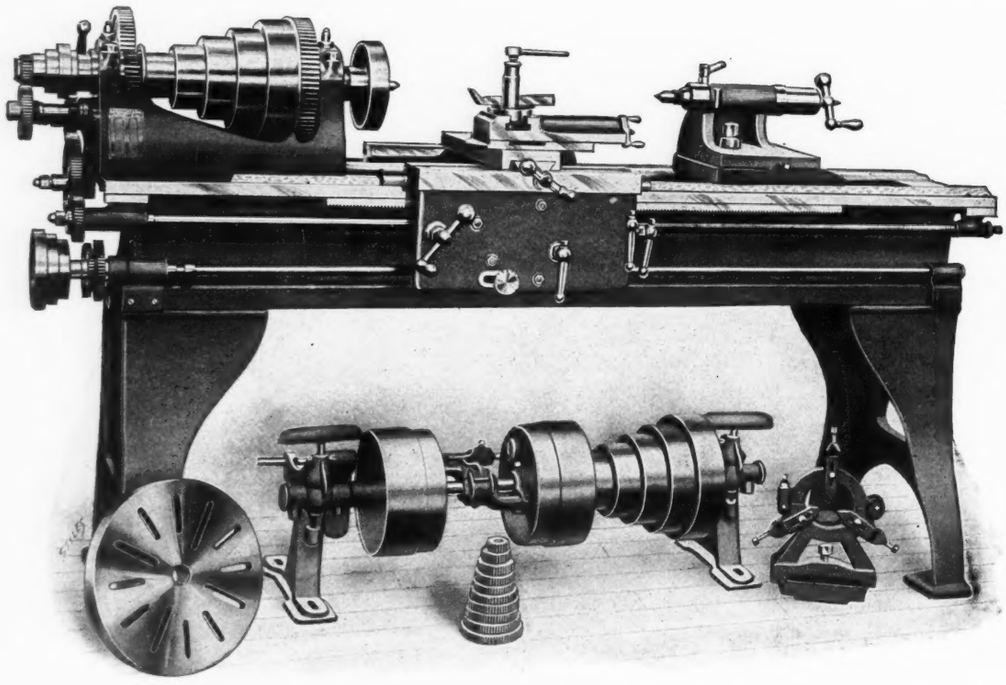
Geared Shapers—15, 22, 26, 30, 34 and 48″ stroke.

The 15-in. x 6-ft. Engine Lathe is typical of all our lathes—strong, rigid and well designed. Sizes from 15″ to 36″.
Prompt deliveries on these machines.

Rack Cutting Machines

Full Automatic and Half Automatic.

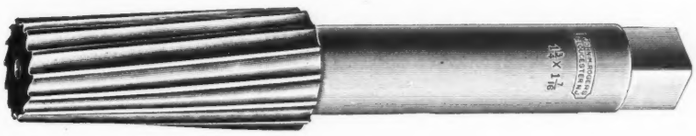
Write for Catalogue.



15-inch by 6-foot Lathe

Geo. D. Walcott & Son, Jackson, Mich., U. S. A.

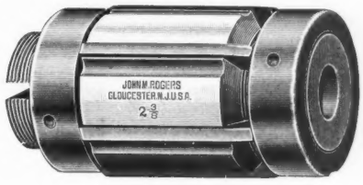
Agents—Frevert Mchy. Co., New York. Chandler & Farquhar Co., Boston. Chas. G Smith Co., Pittsburg. Strong, Carlisle & Hammond Co., Cleveland. Motch & Merryweather Mchy. Co., Cleveland. H. A. Stocker Mchy. Co., Chicago.
Foreign Agents—Fenwick Freres & Co., Paris. Buck & Hickman, Ltd , London.

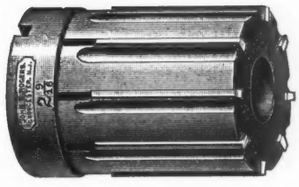


ROGERS REAMERS

"Reliable as the Sun"

There is every reason why Rogers Tools should be the finest for their purpose. They are made from selected, seasoned stock; the workmanship is the best experience, skill and money can produce; and every tool is tested before shipment.





Rogers Reamers Assure Accurate Holes

They are standards for size, durable, simple and cover the field fully. For the up-to-date shop Adjustable Blade Reamers are really a necessity, for after finishing a few holes solid reamers are of no practical use for accurate work, and aside from the advantage of adjusting to size, the shanks are ground to serve as a limit gauge, so that holes below standard size cannot be made. The blades are of the finest steel, hardened, and fitted into dove-tailed slots, the bottoms of which are inclined planes. By driving the blades towards the shank, the cutting edges are expanded to compensate for wear. Blades interchangeable.

Write for Small Tool Catalogue No. 7. Adjustable Blade Reamers, Universal Expanding Blade Reamers, Chucking Reamers, Special Reamers, Etc., and a full line of Measuring Tools and Instruments of Precision.

The John M. Rogers Works

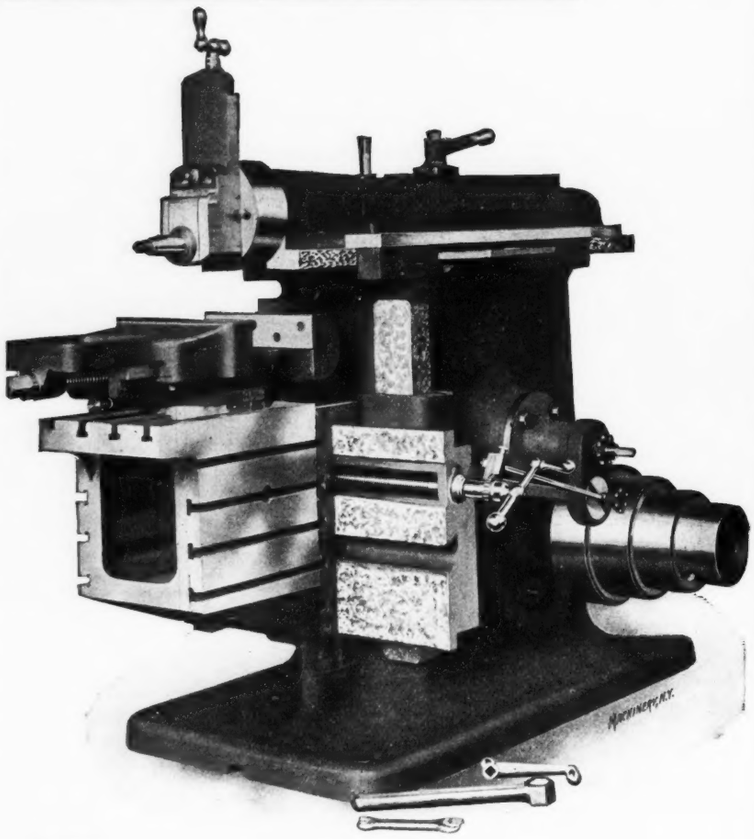
Gloucester City, New Jersey, U. S. A.

ENGLISH AGENTS—Chas. Churchill & Co., Ltd., London, E. C. Selig, Sonnenthal & Co., London, E. C. C. W. Burton, Griffiths & Co., London, E. C. DeFries & Co., Dusseldorf, Germany. V. Lowener, Copenhagen, Denmark.

SPRINGFIELD COST REDUCERS

There isn't a Shop that can do without a good Shaper—

It is an every-day need, an all day need, we might say, and there is no better shaper made than the Springfield 25-inch Back Geared Crank Shaper. Look it over—note the extra large bearing surfaces, the heavy, deeply ribbed column, the massive cross-rail, the special construction that makes a table support *superfluous*. The actual stroke of this machine is 26½ inches, the net weight is 4,600 pounds, and we shall be glad to quote price on demand.



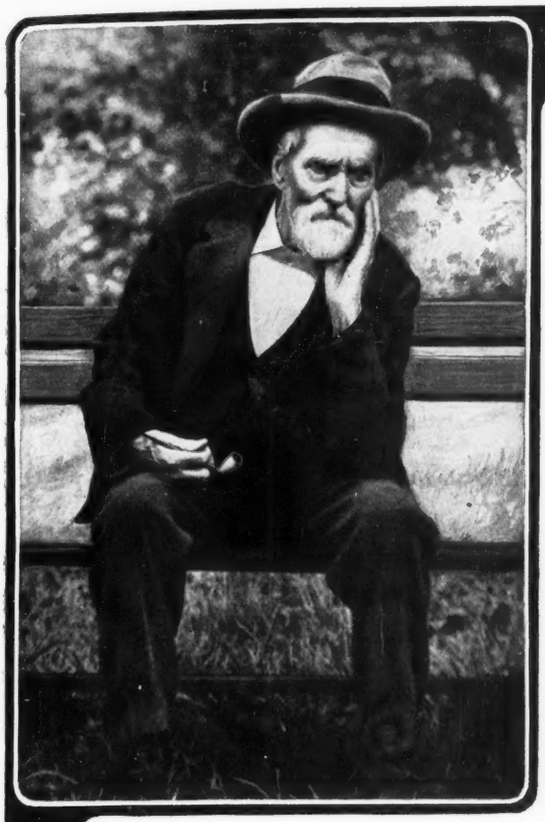
There isn't a Tool Room but has use for this Bench Straightening Press

The size shown is the No. O Press with power enough to bend a shaft 2½ inches in diameter, or its equivalent in other shape. It can be used for centering work in the rough or for straightening pieces accidentally sprung in use or tempering. Easily adjusted. Made in two sizes.

Our Catalogue shows full line of Machine Tools.

The Springfield Machine Tool Co., SPRINGFIELD, OHIO, U. S. A.

Agents for Italy, Ing. Vaghi, Accornero & Co., Milan.



HE NEVER HAD YOUR CHANCE

In this man's day there was little chance for the chap who started out in life as a workman with no special education. He was foredoomed to work for small wages until finally disqualified by old age. With **YOU** it is different. If you are not getting ahead as fast as you should in your chosen occupation, the *International Correspondence Schools* will help you either to gain advancement, or to change to an occupation where there is advancement, or, if you are a young man, they will start you in a good trade half way up the ladder and at a good salary. They do this by providing you, in your spare time and on terms to suit your own particular condition and circumstances of life, with the special knowledge for which managers, superintendents, and all specially trained men holding responsible positions receive large salaries.

A record of nearly 15 years of remarkable success, and the training of thousands upon thousands of men and women for better positions and increased earnings enable us to state positively that we can help **YOU** if you really want to get ahead. It costs you nothing to find out how we can adapt this plan to your own individual case and circumstances. Simply mark and mail this coupon.

Can you afford to miss such an opportunity?

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 980, SCRANTON, PA.

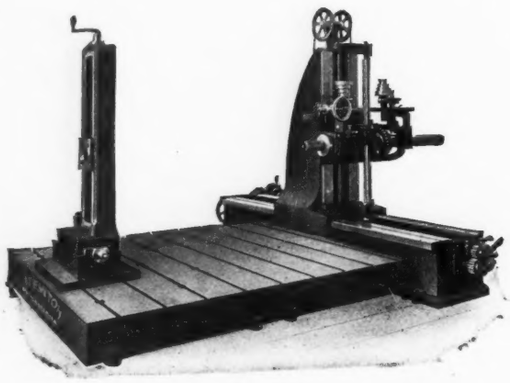
Please explain, without further obligation on my part, how I can qualify for a larger salary in the position before which I have marked X.

Electrical Engineer	Foreman Molder
Electrical Machine Designer	Foreman Blacksmith
Dynamo Foreman	Sheet-Metal Draftsman
Electric Light Supt.	Marine Engineer
Electric Railway Supt.	Hydraulic Engineer
Electrician	Mining Engineer
Telephone Engineer	Chemist
Telegraph Engineer	Assayer
Mechanical Engineer	Illustrator
Machine Designer	Bookkeeper
Mechanical Draftsman	Stenographer
Foreman Patternmaker	Civil Service Examinations
Civil Engineer	Commercial Law
Stationary Engineer	Architect
Gas Engineer	Structural Engineer
Refrigeration Engineer	Contractor and Builder
Foreman Machinist	Ad Writer
Foreman Toolmaker	Window Trimmer

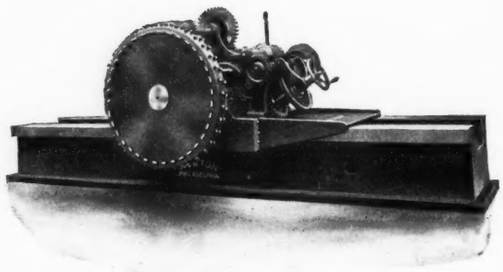
Name _____

Street and No. _____

City _____ State _____

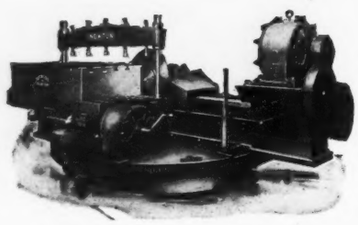


HORIZONTAL FLOOR BORING MACHINE.

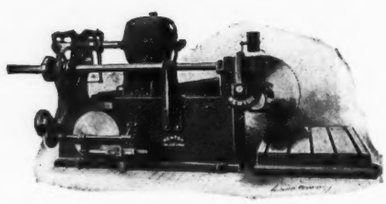


84-IN. PORTABLE ROTARY PLANING MACHINE.

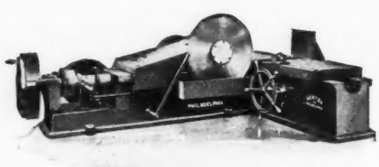
NEWTON



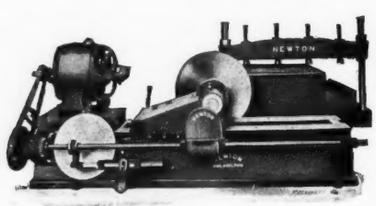
COMBINATION COLD SAW CUTTING-OFF MACHINE.
MOUNTED ON ROUND BASE.



STEEL FOUNDRY COLD SAW CUTTING-OFF MACHINE.



CRANK COLD SAW CUTTING-OFF MACHINE.



COMBINATION COLD SAW CUTTING-OFF MACHINE.

Milling Machines,
Boring and Drilling Machines,
Fixed and Portable Slotting Machines.

Railway and General Machine Shop Equipment.

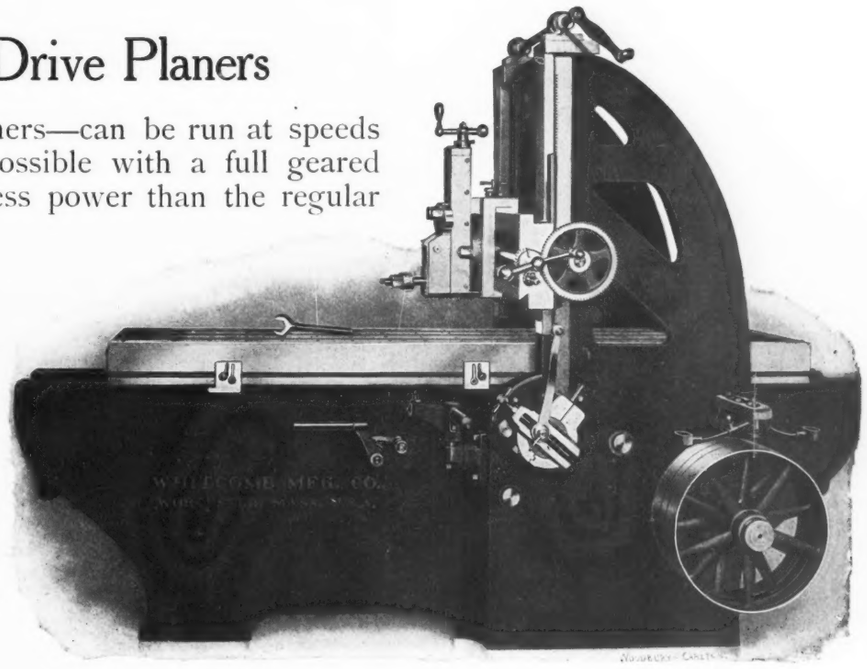
Newton Machine Tool Works, Inc.

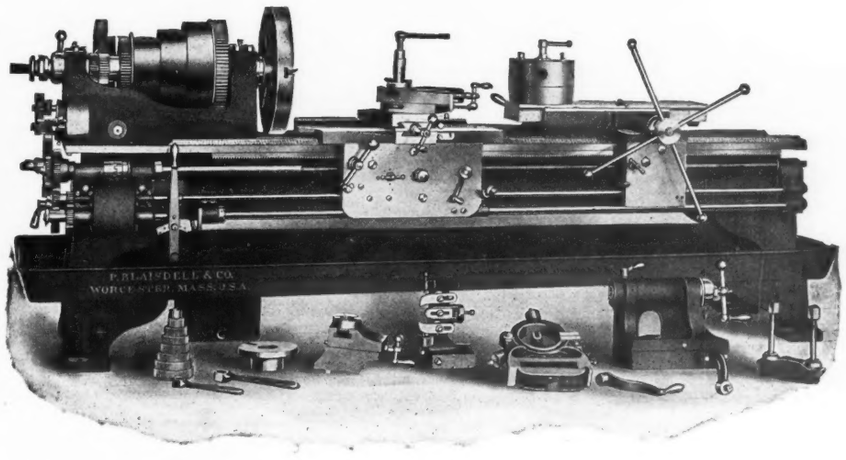
Philadelphia, U. S. A.

To Handle Modern High Speed Steels with a Proper Profit You Require Modern High Speed Machines

Second Belt Drive Planers

are high speed planers—can be run at speeds that would be impossible with a full geared machine, require less power than the regular planer, and turn out the finest grades of work. Their noiseless running, smooth action and general convenience are further points that should have your attention. Sizes from 17″ to 30″.





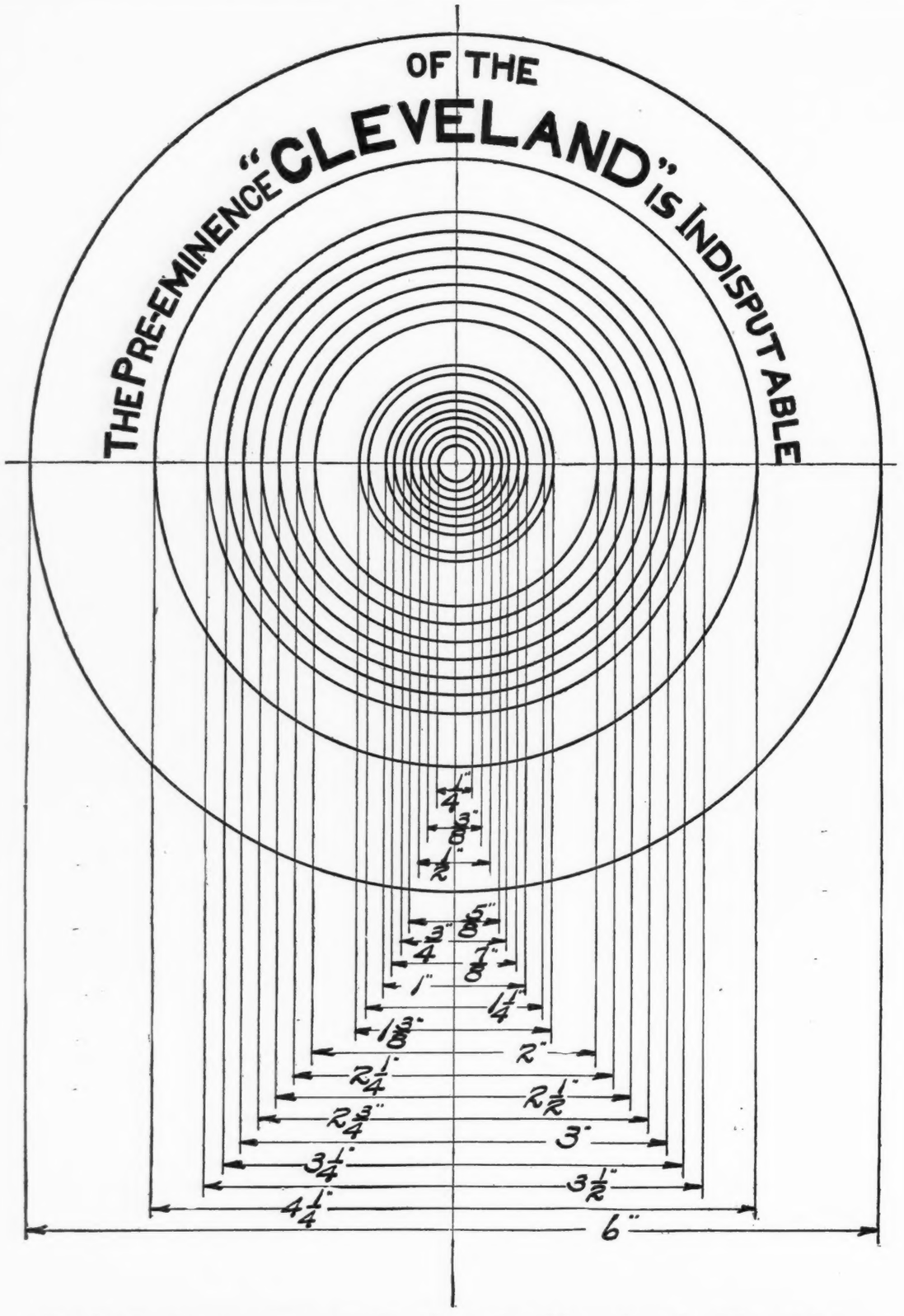
Our line of High Speed Lathes

are also money-makers for the modern shop. This cut shows a 20″ machine, powerfully back geared, with power feed, automatic turret, compound taper rest and rapid change feed device. Sizes range from 13″ to 20″.

OUR CATALOGUE MAILED ON REQUEST.

Whitcomb-Blaisdell Machine Tool Company

WORCESTER, MASS., U. S. A.



Each circle represents the size of a Cleveland. We make parts from bars weighing from 1 ounce to 1000 pounds.

Cleveland Automatic Machine Co., Cleveland, Ohio, U. S. A.

Eastern Representative—J. B. Anderson, 2450 North 30th St., Philadelphia, Pa. Western Representative—H. E. Nunn, 199 Lake St., Chicago, Ill.
Canadian Representative—G. H. Howard, Dundas, Ont.
Foreign Representatives—Messrs. Chas. Churchill & Co., London, Birmingham, Newcastle-on-Tyne and Glasgow. Messrs. Schuchardt & Schutte, Berlin, Stockholm and St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milano and Bilbao.

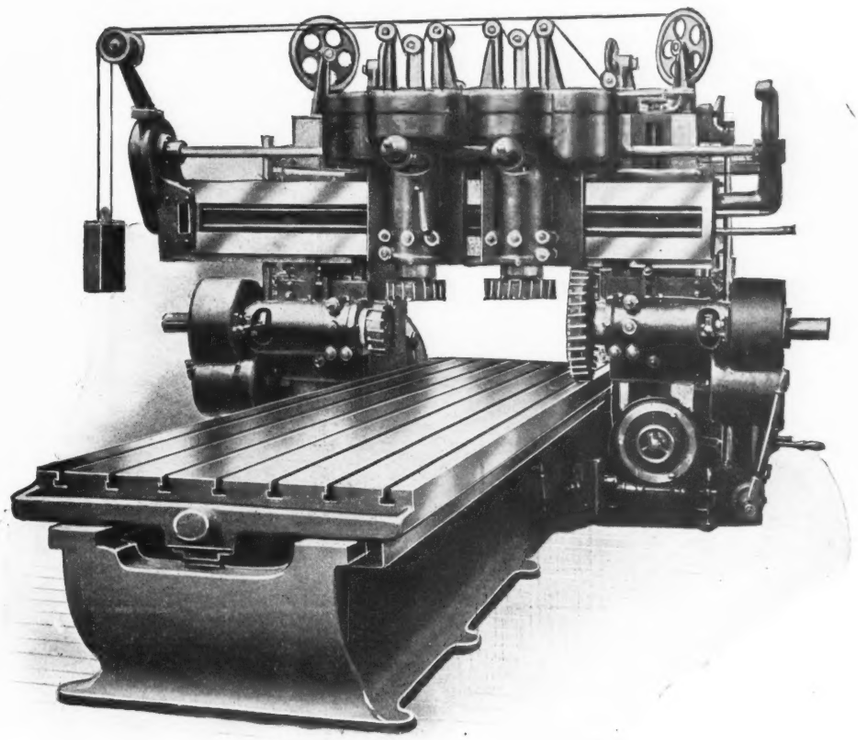
Heavy Milling Machines

EXCLUSIVELY

That means we build the best and most up-to-date machines

NEW CATALOGUE JUST OUT

Sizes from 20" x 20" x 6' to 10' x 10', any length



Types: Any combination of spindles conceivable

48-inch Four Head Machine

ALL SPINDLES DRIVEN BY SPUR GEARS CUT FROM STEEL CASTINGS, ENCASED AND RUNNING IN GREASE. TABLE FEED POSITIVE. ALL ADJUSTMENTS BY POWER.

The Ingersoll Milling Machine Co.

ROCKFORD, ILL., U. S. A.

Cleveland Office, 307 Schofield Building **New York Office, 114 Liberty Street**

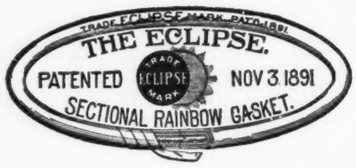
The Eclipse Sectional Rainbow Gasket

The Eclipse Sectional Rainbow Gasket is the only tubular Gasket in the world that will hold 3,000 lbs. pressure and that will do the work. Why? Because it is the only Gasket that is made of the

Celebrated

Rainbow Packing Compound

3-8 inch, 1-2 inch, 5-8 inch.
For Hand Holes.
In Boxes 3 to 5 lbs.



3-4 inch, 7-8 inch, 1 inch.
For Extra Large Joints
In Boxes 4 to 6 lbs.

Fac-Simile of a 6-inch Section of Eclipse Gasket Showing Name and Trade-Mark Imbedded

We have the most modern and extensive Rubber Factory in the world and manufacture the highest grade of all kinds of mechanical rubber goods, including

Pump Valves	Rubber Gas Bags	Faucet Balls
Gauge Glass Rings	Rubber Hat Bags	Garden Hose
Gaskets and Rings	Fire Hose	Tubing
Rubber Buckets and Pails	Landing Pads	Diaphragms
Discs	Hose Nipple Caps	Air Brake Hose
Rubber Belting	Mats, Matting	Steam Hose
Packings	Rubber Mallets	Suction Hose
Rubber Springs	Tiling	Pneumatic Tool Hose

SOLE MANUFACTURERS OF THE CELEBRATED RAINBOW PACKING.

MANUFACTURED EXCLUSIVELY BY

The Peerless Rubber Manufacturing Company,

16 WARREN STREET, NEW YORK.

16-24 Woodward Ave., Detroit, Mich.
209-211 Magazine St., New Orleans, La.
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1212 Farnam St., Omaha, Neb.
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634 Smithfield St., Pittsburg, Pa.
1621-1639 17th St., Denver, Col.
220 South Fifth St., Philadelphia, Pa.
17-23 Beale St. & 18-24 Main St., San Francisco.
20th St. and Railroad Ave., Birmingham, Ala.
1221-1223 Union Ave., Kansas City, Mo.
709-711 Austin Ave., Waco, Texas.
51-53 N. College St., Charlotte, N. C.
Cor. Ninth and Cary Sts., Richmond, Va.
422 Second St., Macon, Ga.

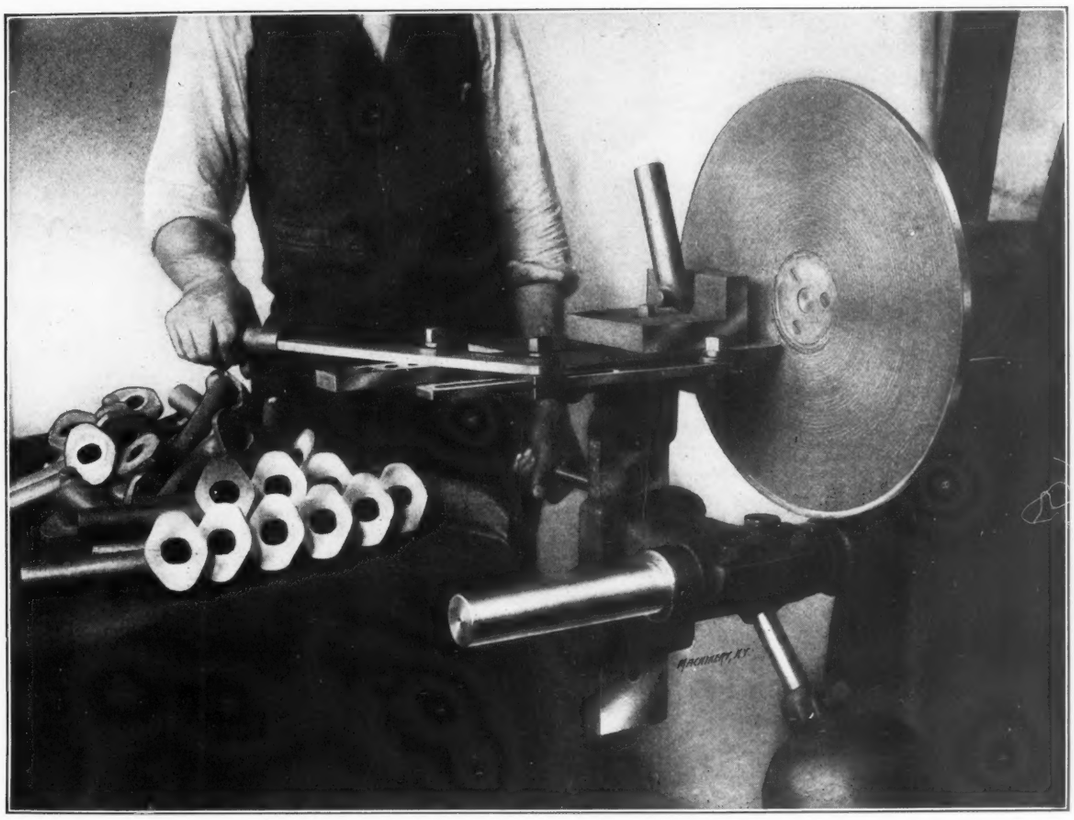
DISC GRINDERS

Charles H. Besly & Co

SPIRAL GROOVED DISCS SPIRAL CIRCLES

HELMET TAPS ARE THE STANDARD

ORIGINATORS OF DISC GRINDERS



A Record Brass Grinding Job

The economy of Besly grinding methods is further illustrated in the engraving above, which shows a No. 10 Besly Grinder at work on Cast Brass Engine Pipe Connections. In this instance, the grinder is provided with a lever attachment, on which is mounted a cast iron angle plate which holds the work without clamping. The castings are rough, leaving a surface 3 1/8" x 2 3/8" to be finished; stock removed, 3-64"—and the work is turned out at the rate of 300 pieces per hour. Not only is there a noteworthy time saving on this job, but as the spiral circles used last about five hours, the cost for abrading discs is only 2 or 3 cents to a hundred pieces ground.

Besly Grinders are the Original Disc Grinders, and are adapted for flat surface grinding of every kind. They do more work, do better work and save more money on grinding than any other grinder made. We shall be glad to prove this to you if you will send us a sample of your work. We will finish and return the piece free of charge, marking time required, composition of circle used and the size of machine. Write today.

Charles H. Besly & Company

15-17-19-21 South Clinton St., Chicago, Ill., U. S. A.

We Excel in Cutter Grinding

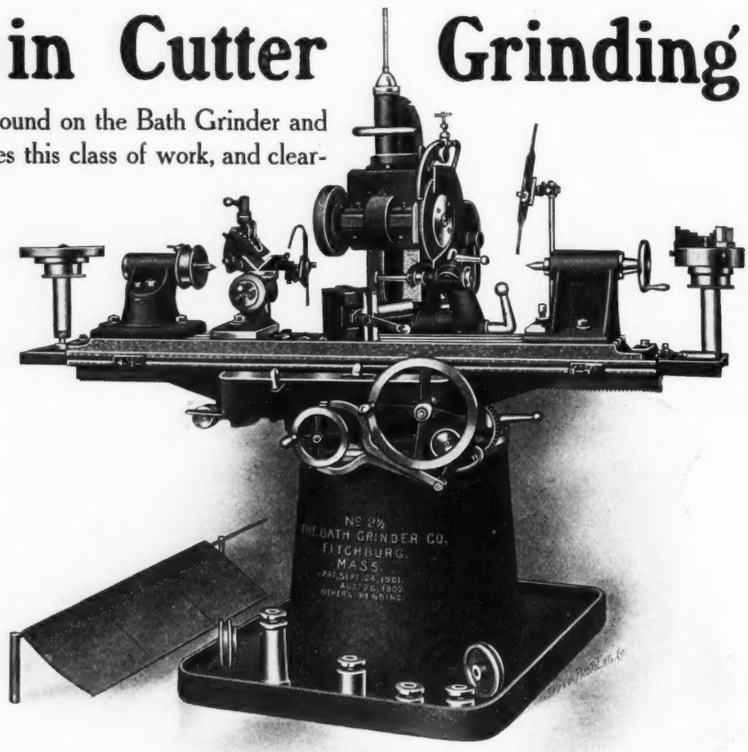
Every variety of cutter can be ground on the Bath Grinder and ground right. A cup wheel facilitates this class of work, and clearances are measured on the machine.

The Bath Universal Grinder

Covers the whole field of grinding. It is equipped for wet or dry grinding; has power feed and fine screw attachment to wheel for surface grinding; and an attachment for internal grinding clamps to the front of the machine. Very high speed can be attained with the latter attachment, and for internal deep hole grinding Bath machines stand pre-eminent.

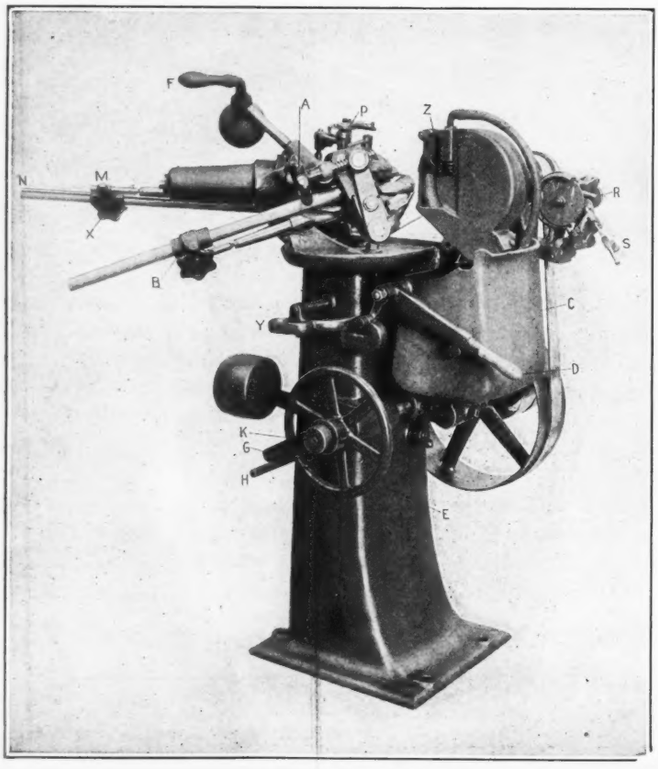
These grinders are very substantial and rigid and have every provision for convenient operation.

Our catalogue shows work and wheel in positions no other grinder can give—shall we mail you a copy?



BATH GRINDER COMPANY, - Fitchburg, Mass., U. S. A.

William Sellers & Co., Incorp. Philadelphia, Pa.



Modern Machine Tools

Our Patent Improved Drill Grinding Machine with Pointing Attachment, shown in the cut, is capable for all sizes of drills from 1-16″ to 3″ diameter inclusive.

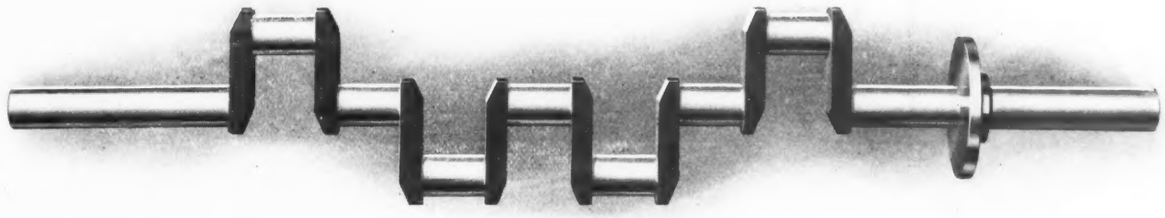
Drills ground and pointed by it last longer and do much more work before regrinding is necessary, require less power of feed and cut faster than when ground in any other way.

The machine while accomplishing remarkable results, is extremely simple and does not require a skilled workman to handle it, as nothing is left to the judgment of the operator.

All parts are interchangeable, and wear of parts does not cause lost motion.

Our new illustrated descriptive catalogue is now ready. Shall we send you a copy?

Automobile Crank Shafts as They Should Be



We have a special department devoted to this class of work, special machines for accomplishing it, and can furnish crank shafts accurately ground on all cylindrical parts. We do all the work, with the exception of the forging, grind the wrists and journals in the highest degree of refinement, and when necessary to do so, mill the cheeks of the cranks. Our methods are the most advanced and approved, our machines adapted to the production of absolutely accurate work; we are already furnishing crank shafts to some of the largest automobile builders, and shall be glad to estimate on your work.

To purchasers of our Crank Grinding Machines we are glad to explain our method of making Crank Shafts.

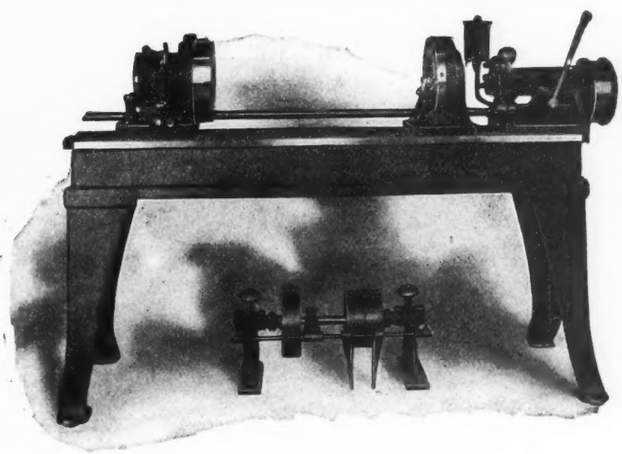
Norton Grinding Company, Worcester, Mass.

Ludw. Loewe & Co., Berlin and London, European Agents.

THE WHITON

Revolving Centering Machine

For Accurately Centering Finished Shafts.



The cut shows new REVOLVING CENTERING MACHINE—a larger size of the well known machine of this type. It is heavier throughout and has capacity to center shafts up to 5 inches in diameter.

Constructed same as the smaller machine and embodies all the special features.

Circular and prices sent upon application.

The D. E. Whiton Machine Company,

New London, Connecticut.

The B. & C. Friction Clutches

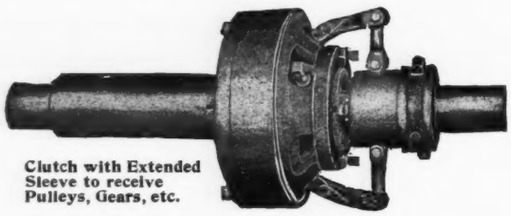
Have Powerful Grip, Positive Release and are very Easily Adjusted.

These Clutches are adapted for use with wood split pulleys, steel or iron pulleys, sprockets, gears, hoisting drums, etc., have very few parts, all friction surfaces protected from dust and grit, and will give long and efficient service.

There is also a special B. & C. Clutch for Gas and Oil Engines.

Full description and prices on request.

Clutch with Wood Split Pulley attached.



Clutch with Extended Sleeve to receive Pulleys, Gears, etc.

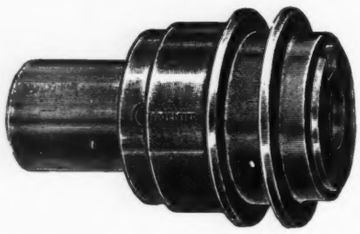
Any kind of a pulley can be used with a B. & C. Clutch no bother or expense for special pulleys entailed—and in adjusting no arm fastenings are necessary, the pulley, gear or other device is simply clamped on the extended sleeve, and can be changed without disturbing the clutch.

Patterson, Gottfried & Hunter, Ltd., 146-150 Centre St., (Cor. Walker) **New York City**

Machinery, Metals, Hardware Tools and Supplies.

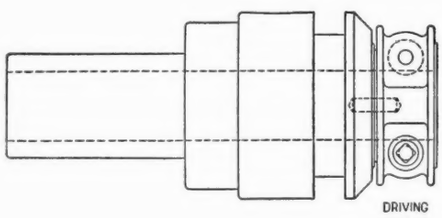
THE JOHNSON FRICTION CLUTCH

is very compact in form, smooth and highly finished. It has very few parts—and those interchangeable; has no protruding nuts or screws, runs without vibration, runs perfectly at any speed, and can be adjusted to any tension by a single screw.



For Line Shafts

this clutch will be found particularly advantageous. It can be used for running a group of machines direct from the line shaft instead of providing a countershaft for each machine. The saving thus effected in pulleys, power, countershafts, belts, etc., is a very considerable item and will go a long way towards paying for the equipment. A feature of the clutch for line shafts is the new Driving Collar, which is doweled to the clutch body and fastens to the shaft by two binder bushings, obviating the necessity of cutting keyways in the shaft and permitting the clutch to be moved to any point desired.



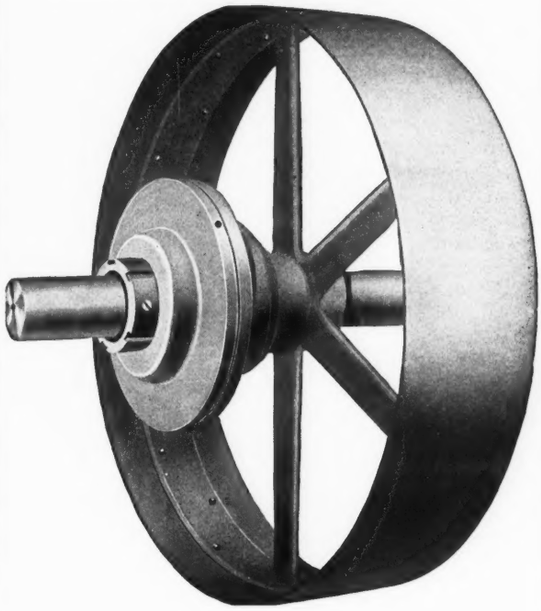
Clutch made Single or Double. Write for catalogue.

The Canadian Fairbanks Co., Agents for Canada—Montreal, Toronto, Winnipeg, Vancouver. The Efandem Co., 67 Shaftsbury Ave., London, Eng.

THE CARLYLE JOHNSON MACHINE CO. HARTFORD, CONN.

The Williams Friction Clutch

Does not require a special pulley, nor any attention other than oiling.



The Clutch is entirely separate from the pulley and is easily interchangeable—gears or sprocket wheels may be mounted on the clutch hub as occasion demands.

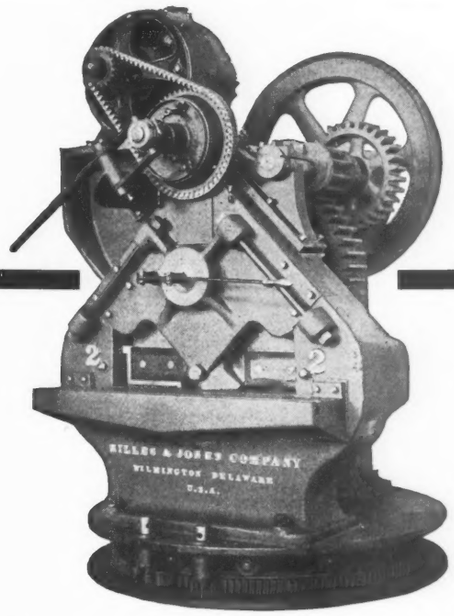
It is very simple in construction, compact, has all working parts protected from dirt and grit, and the action is smooth and positive, without noise or vibration. The light weight is another good feature, particularly when the clutch is used on very long shafts or the overhanging ends of shafts. Further advantages are its ability to start machinery instantly, or gradually as desired, its durability under severe service, and the fact that it will slip automatically without damage should the load exceed the horse power of the clutch.

The Williams Clutch is adapted for driving dynamos, gas engines, clay working machinery, rubber mills and other severe duty, and in many instances will give entire satisfaction where other clutches have failed.

Write for the book.

The Williams Electric Machine Co.

AKRON, OHIO



Electric Motor Drives

DO YOU USE THEM?

Now that electricity is being used almost entirely for driving machine tools in up-to-date shops, it is exceedingly important that this power be conserved in every way. The chief reasons for using electricity are those of economy, and there would be very little advantage in putting in an expensive electrical installation if this energy is wasted through inefficient methods of transmission.

The Morse Silent Rocker Joint Chain

represents the greatest advance in power transmitting mechanisms in recent years. These chains are adapted to any power, can be speeded up to 2000 feet per minute, require scarcely any lubrication, adapted to either short or long centers, are absolutely noiseless and show a sustained efficiency of over 98 per cent.

Some makes of silent chains are forced to use bushings to take up the wear in the joints. Owing to the construction of Morse Chains there is no necessity for bushings as the rocker joint, constructed of two pieces of hardened tool steel so arranged that one rocks or rolls upon the other, is practically indestructible and will stand years of hard and continuous service. Isn't it worth while paying a little more for a reliable and well nigh indestructible chain than to purchase cheaper and inferior chains which will WEAR OUT.

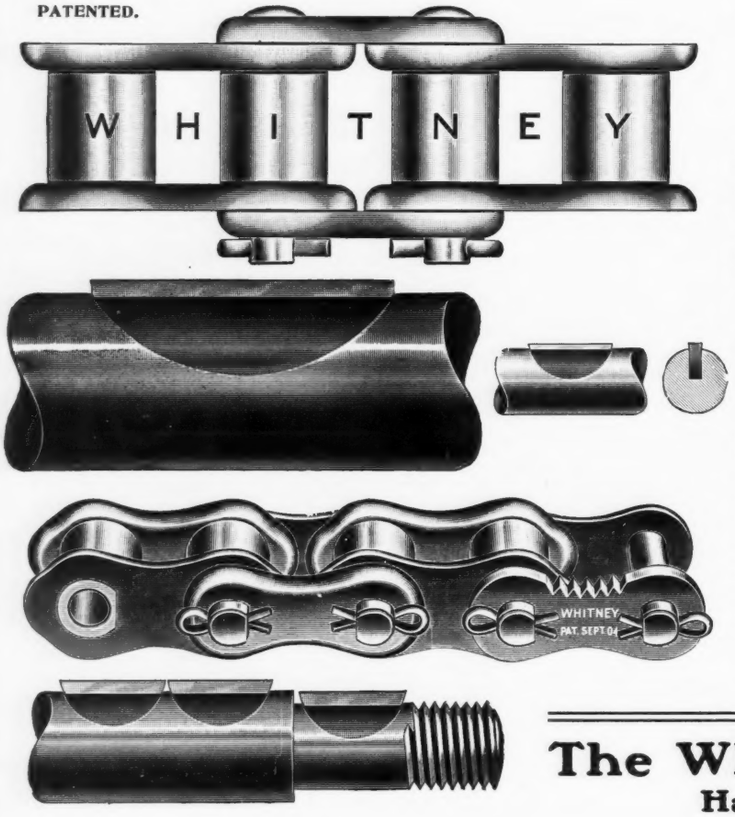
Learn more about them by writing for our Booklet No. 7.

Morse Chain Company

Trumansburg, N. Y.

Licensees for Great Britain and Europe:
The Westinghouse Brake Co., Ltd.,
82 York Road, King's Cross, London, N.

PATENTED.



"WHITNEY" CHAINS

and the WOODRUFF PATENT SYSTEM of KEYING have been adopted by the leading manufacturers of motor cars.
The Woodruff System is more mechanical, more efficient and a great labor saving invention.

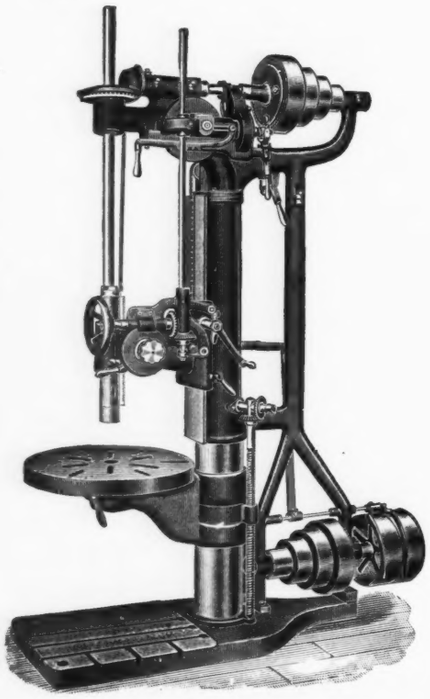
Against claims made by Competitors, we submit the following list of Motor Car Manufacturers using **"WHITNEY" ROLLER CHAINS** and **STANDARDS.** Is it not time for everyone to admit that **"WHITNEY" STANDARDS** for **ROLLER CHAIN** dimensions are now the American Standards?

"Adams-Farwell," "American Motor Truck," "Auto-Car Equipment," "Baker," "Berkshire," "Biddle-Murray," "Cadillac," "Columbia," "Champion (McCrea)," "Crown," "Crawford," "Columbus Buggy Co.," "Elwell-Parker," "Ford," "Franklin," "Gaeth," "Gale," "Grout," "Hewitt," "The Holmes," "Iroquois Iron Works," "Knox," "Lambert," "Matheson," "Mack Brothers," "Mitchell," "Moline," "New York Motor Truck," "Olds," "Packard," "Rambler," "Rapid," "Reo," "Stearns," "Thomas," "Tourist," "Vehicle Equipment," "Wayne," "Western Motor Truck," "Windsor," etc.

The Whitney Mfg. Co.
Hartford, Conn.

TRADE W.F. & J.B. CO. MARK

"ORIGINAL BARNES"



Positive Feed Drills

8-inch to 50-inch Swing

CONSIDER THESE ADVANTAGES:

1st. Absolutely positive action.
2d. Eight (8) changes of feed.
3d. No belts to throw off or on.
4th. Feed changes can be made while machine is running.
5th. Capacity of drill increased 15 to 25 per cent.
6th. Adapted for use of high-speed cutting steels.

Send for Drill Catalogue.

W. F. & John Barnes Co.
231 Ruby Street, Rockford, Illinois

A Powerful Saving in Power

added to a daily increase in production ranging from

200 Per Cent to 400 Per Cent

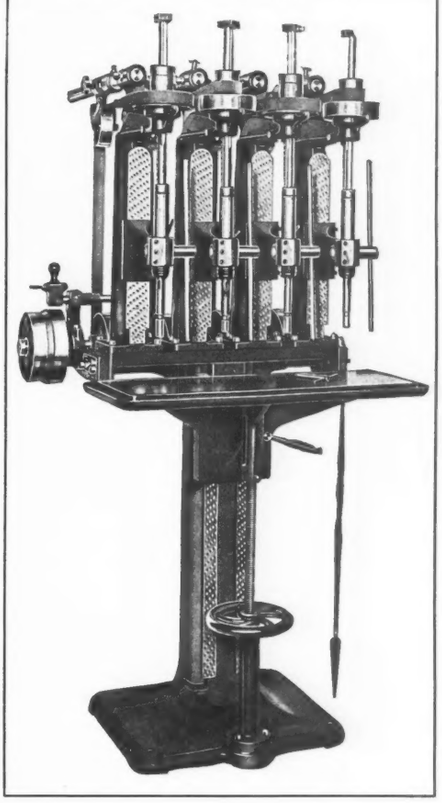
is the pleasing result of installing Henry & Wright Ball Bearing Drills (Rice Patents) in your shop.

Another advantage is the durability of these machines. Built with ball bearings throughout, even to the loose pulley used with the driving belt, friction is reduced to a minimum and the wearing qualities more than doubled. Furthermore, easy running at highest speed is assured and less power is required. Not only less power consumed in running the drill press, but there is actually more power at the drill point than in other machines, permitting high speed drills to be driven to their full limit. The belt system is simple, no lacing of belts; general oiling is not required oftener than four times a year; four speeds are available at all times and the new hand feed permits any adjustment without the use of thumb screws.

Catalogue gives further particulars.

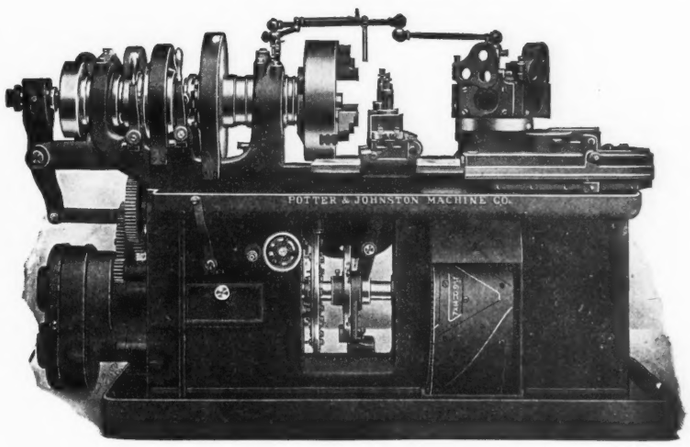
The Henry & Wright Mfg. Company

HARTFORD, CONN., U. S. A.



The Advantages which the

Potter & Johnston Manufacturing Automatics



Offer for machining your duplicate parts, either from castings, forgings or the bar are manifold, and the fact that one attendant can operate in groups of four to eight machines should appeal to all manufacturers.

Catalogue fully illustrates and describes—sent free for the asking.

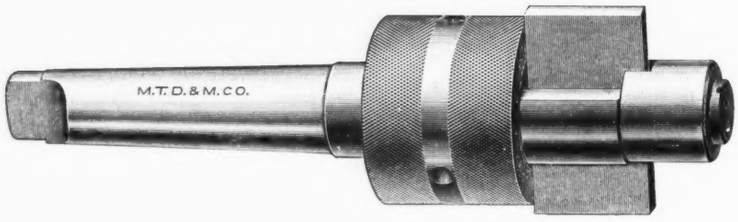
Estimates cheerfully furnished upon receipt of drawings or sample parts. May we not point out where we can show a saving through the use of these machines over your present methods?

Potter & Johnston Machine Co., Pawtucket, R. I., U. S. A.

Paris Office, 78 Avenue de la Grand Armee, J. Ryan, Manager. New York Office, 114 Liberty Street, Walter H. Foster, Manager. Cleveland Office, 309 Schofield Building. Chicago Office, 933 Monadnock Building. Foreign Agents: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne, England and Glasgow, Scotland. Alfred H. Schutte, Cologne, Brussels, Liege, Milan, Barcelona. Schuchardt & Schutte, Berlin, Stockholm, Vienna, St. Petersburg.

"MORSE"

COUNTERBORES and COUNTERSINKS



Drills with Increase Twist. Drills with Parallel Web. Drills with Constant Angle.
Drills of High Speed Steel, (our own special brand.)

REAMERS, CHUCKS, MILLING CUTTERS, TAPS, DIES, MACHINES AND MACHINISTS' TOOLS.

MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDFORD, MASS., U. S. A.

STANDARD TWIST DRILLS

THE SHIELD STAMPED KIND

Greatest Efficiency

Accuracy and Durability

THE STANDARD TOOL COMPANY

New York, 94 Reade St. Cleveland, 1260-1288 Central Ave.

London Office, C. W. Burton, Griffiths & Co. Burton Fils, Paris, France. J. Lambercier & Cie, Geneve.

GOULD & EBERHARDT

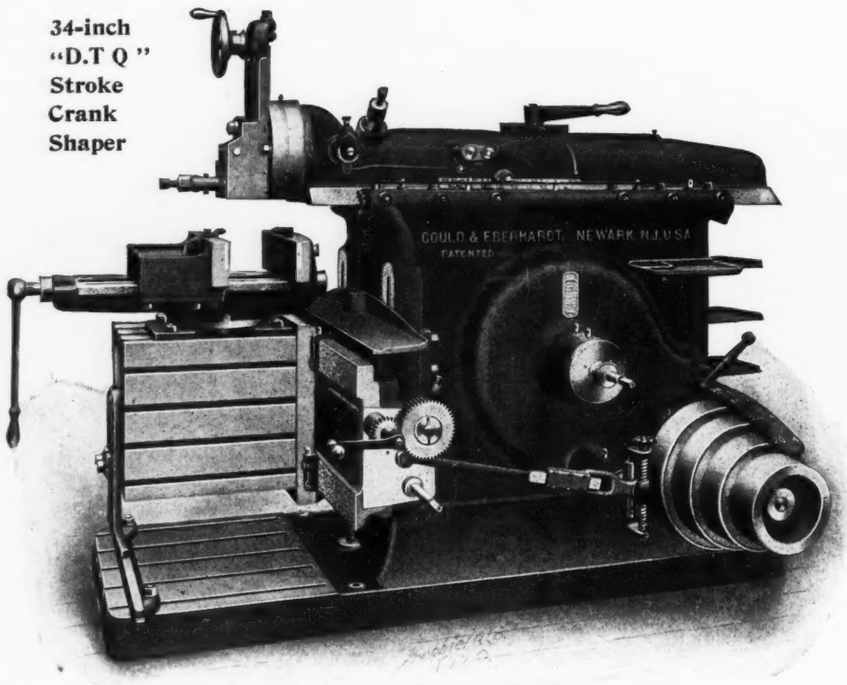
AUTOMATIC GEAR CUTTING MACHINERY

NEWARK N. J. U. S. A.

Designers and Builders of HIGH CLASS MACHINE TOOLS.

HIGH DUTY SHAPERS

34-inch "D.T Q" Stroke Crank Shaper



Double the Number of Strokes

Can be obtained with the Eberhardts' Patent "Double Triple Quick" Stroke Shaper than with a machine of other construction. Through this system the cutting speed can be instantly changed to suit the metal being worked—slowed up for a short tool steel job, or pushed to the limit on brass or softer metals.

The largest of this style Shaper is the 34″ size, a "high duty" machine, designed especially to get the best results from high speed steels. It is very powerful, runs smoothly, even at highest speeds, has eight speed changes for each change of stroke, and is equipped with our patent extension base—insuring rigidity even under the heaviest cuts; while the crank motion insures accurate work. There is a great deal of work now done on the planer that these Shapers can handle with equal efficiency and in less time. Write for Shaper Catalogue.

We build this style Shaper in 16″, 20″, 24″ and 34″ sizes. Motor drive when desired.

SELLING AGENTS—Baird Machinery Co., Pittsburg, Pa. Marshall & Huschart Machinery Co., Chicago and St. Louis. The Motch & Merryweather Mchy. Co., Cleveland and Detroit. The Fairbanks Co., Philadelphia and Baltimore. Henshaw, Bulkley & Co., San Francisco. Hallidie Mchy. Co., Seattle. Prentiss Tool and Supply Co., New York, Boston, Buffalo and Syracuse.

G&E SHAPERS "QUALITY"

FOREIGN AGENTS—Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Milan and Paris. Selig, Sonnenthal & Co., London, England. John Lang & Sons, Johnstone, Scotland. F. W. Horne, Yokohama. Adolfo B. Horn, Havana, Cuba.

I am Schieren's oldest employee.

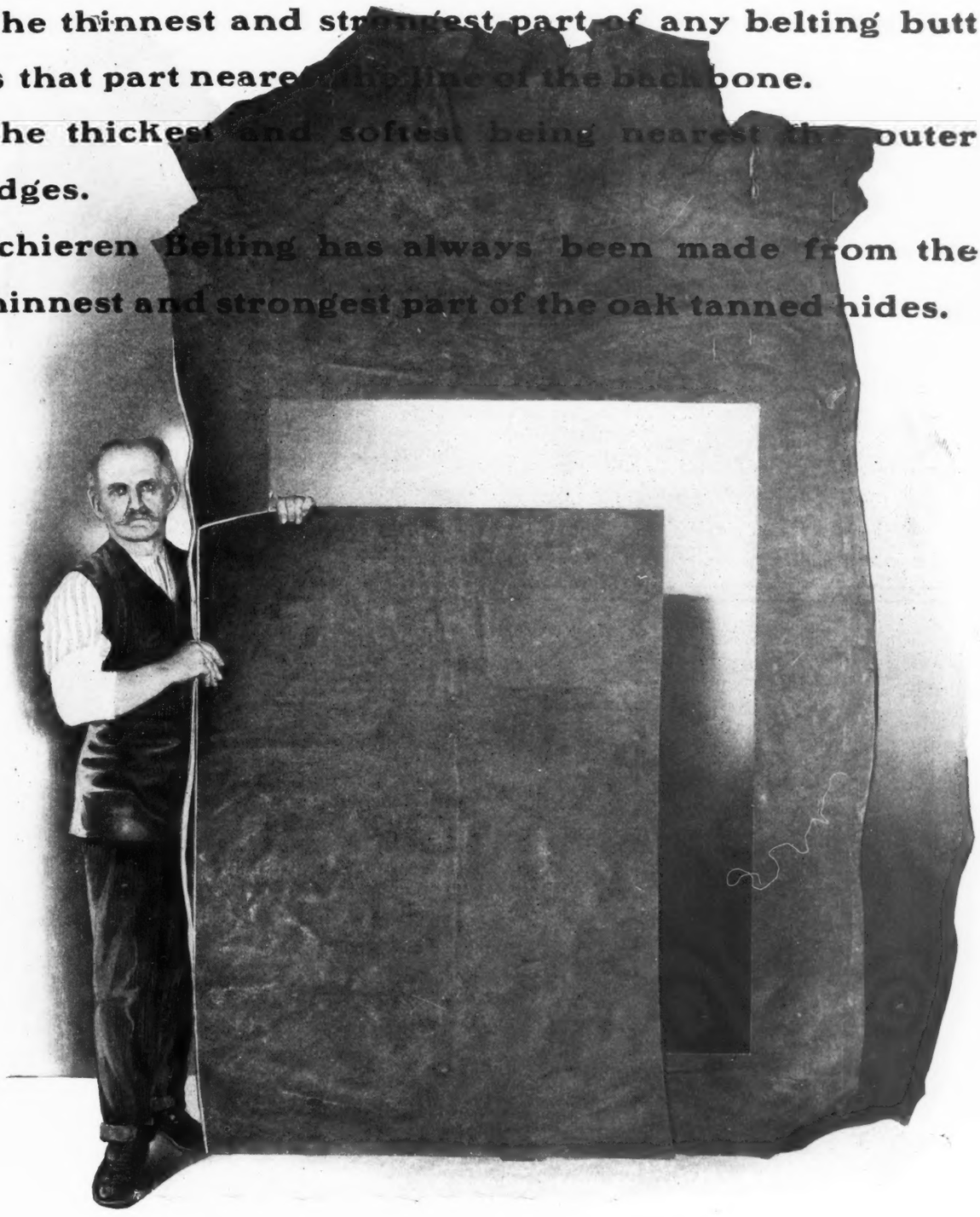
Been with the firm since they started business in 1868 and know the belting trade from A to Z.

Never pick a belt out for its thickness.

The thinnest and strongest part of any belting butt is that part nearest the line of the backbone.

The thickest and softest being nearest the outer edges.

Schieren Belting has always been made from the thinnest and strongest part of the oak tanned hides.



CHAS. A. SCHIEREN & COMPANY

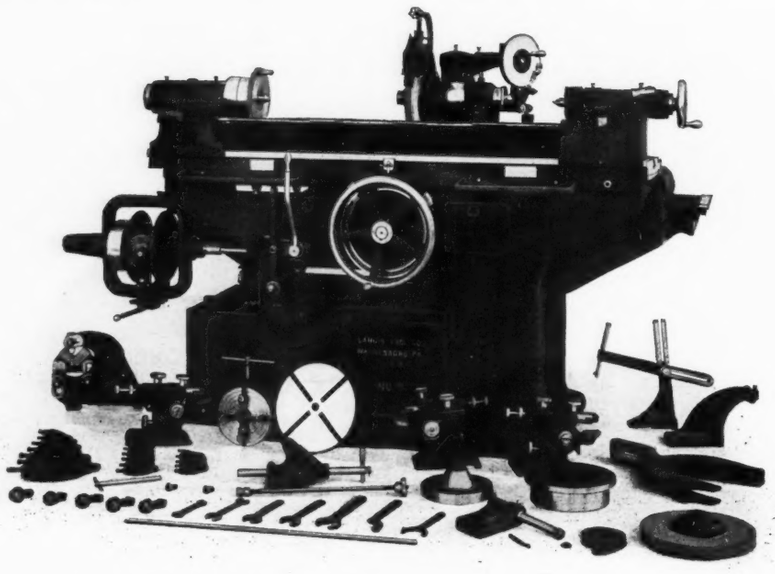
29 FERRY STREET, NEW YORK

Boston, 191 Lincoln St.
Pittsburg, 239 3d Ave.
Hamburg, Auf dem Sande, 1.
Chicago, 89 Franklin St.
Philadelphia, 221 N. Third St.
Denver, 1513 Sixteenth St.

A Wide Range Grinding Machine

The Landis Universal Grinding Machine No. 3

has 12 inch swing, 42 inches between centers and is adapted for grinding shafts, spindles, cones, etc.—all work that can be carried by a face plate or chuck, internal or external, and a great variety of tool room grinding. It is rigid, powerful and noted for accuracy. It provides a very rapid method of finishing manufactured parts, producing work of the highest grade; and fitted with special attachments will handle such lines of grinding as reamers, straight or taper, gauges, dies, arbors and all kinds of cutter grinding, with a most satisfactory economy.

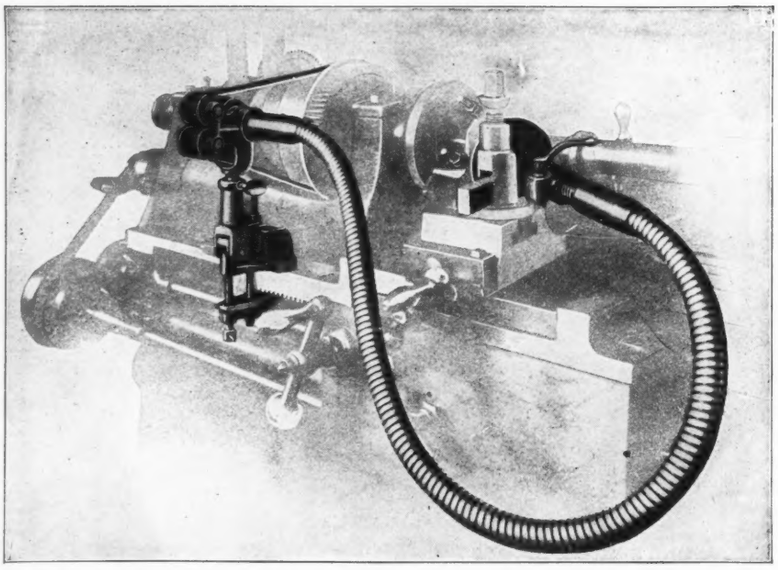


Write us for further facts about Grinding Machines.

Landis Tool Company, Waynesboro, Pa., U.S.A.

AGENTS—W. E. Flanders, 309 Schofield Bldg., Cleveland, O., and 933 Monadnock Block, Chicago, Ill. Walter H. Foster Co., 114 Liberty St., New York. C. W. Burton, Griffiths & Co., London. Schuchardt & Schutte, Berlin, Vienna, Stockholm and St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan and Bilbao. A. R. Williams Mchy. Co., Toronto. Williams & Wilson, Montreal, Canada.

COATES UNIT LINK FLEXIBLE SHAFTING



Let us send you this belt-driven center grinder on 10 days trial.

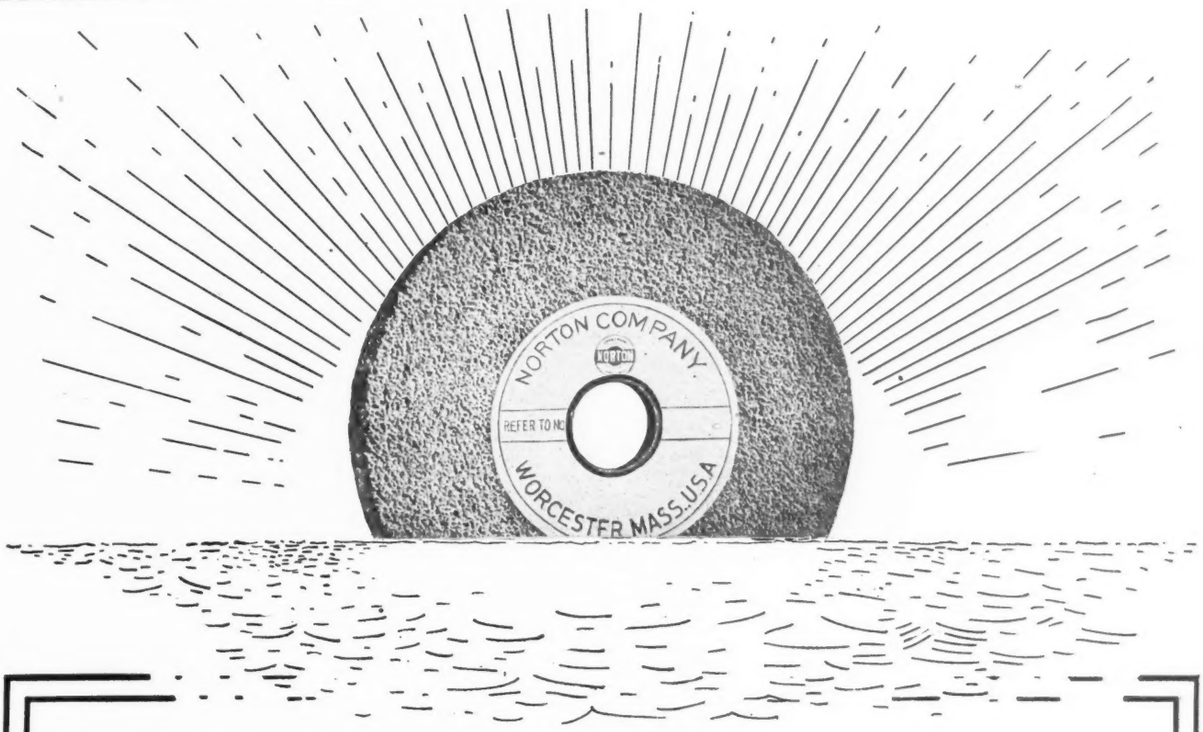
Grinds Centers, Arbors, Cutters.

We make many other interesting devices.

Send for book No. 221.

Coates Clipper Mfg. Company, Worcester, Mass., U.S.A.

LONDON OFFICE: 118 HOLBORN.



The Rise of the New Abrasive

ALUNDUM

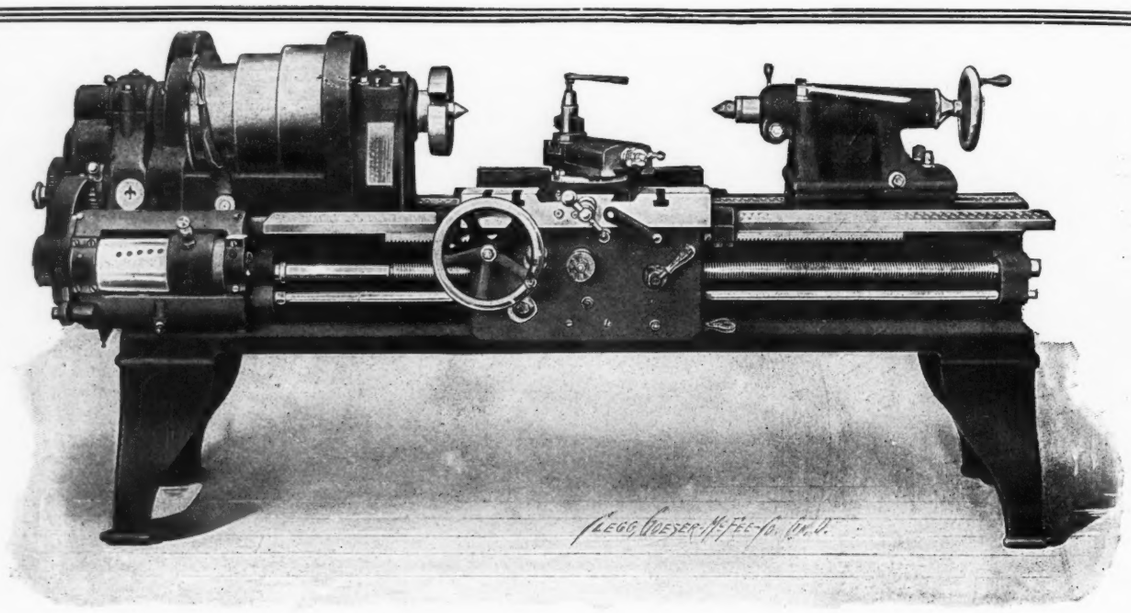
The Steady Progress made by Norton Alundum Wheels in the estimation of the best mechanics is as sure and irresistible as the sunrise : : : :

Alundum has been proved the hardest, sharpest, most uniform abrasive in the world. The wheels are manufactured in an ultra-modern plant, under scientific methods, are adaptable to every grinding need, and any wheel can be duplicated.

NORTON COMPANY

FORMERLY NORTON EMERY WHEEL COMPANY

WORCESTER, MASS. NEW YORK, N. Y.
NIAGARA FALLS, N. Y. CHICAGO, ILL.

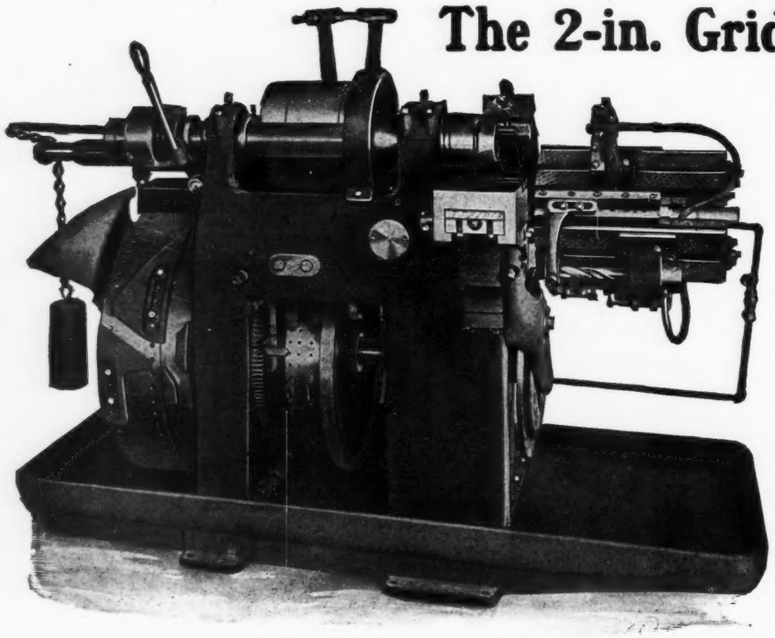


LeBlond 20" High Speed Engine Lathe

Has 18 spindle speeds ranging from 32 to 275 revolutions per minute. Correct cutting speed can be obtained for practically all diameters. Our double friction back gear gives it the pulling power and is a great improvement over any other friction head. Cone is 11½" to 13½" diameter for 4½" belt.

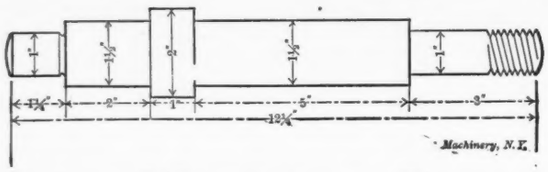
The R. K. LeBlond Machine Tool Company

4605 Eastern Avenue, Cincinnati, Ohio



The 2-in. Gridley Automatic Turret Lathe

Does not require an expensive outfit of tools, and it does work twice the length of any other Automatics.

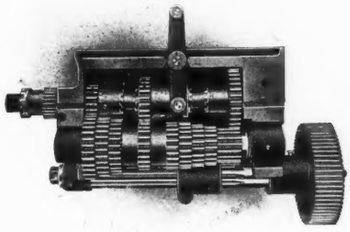


Windsor Machine Company, Windsor, Vt.

The Flather Quick Change Gear Lathe

Latest and Best.
Strong and Simple.
Greatest number of
Threads and Feeds.
Least number of Gears.

Send for descriptive circular.

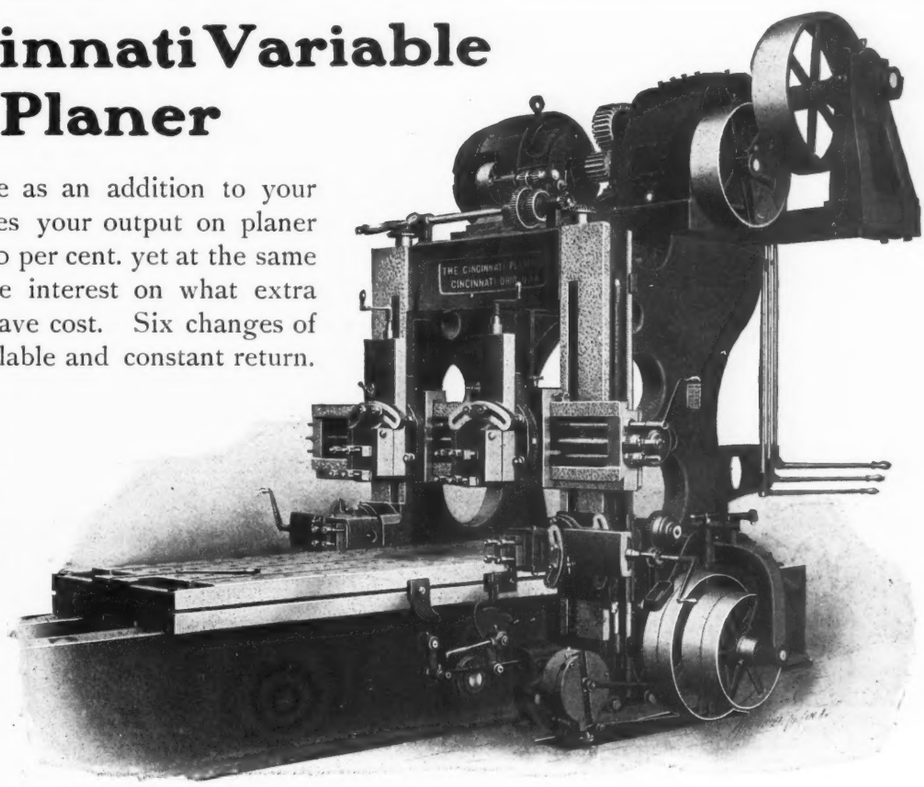


Flather & Company, Incorporated, Nashua, N. H.

A Cincinnati Variable Speed Planer

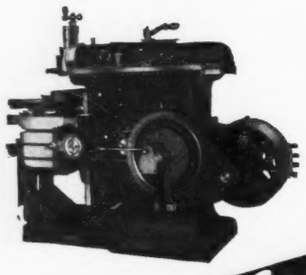
Is almost the same as an addition to your plant. It increases your output on planer work from 30 to 50 per cent. yet at the same time lets you save interest on what extra machines would have cost. Six changes of speed always available and constant return. The proper speed for every cut you take. Figure it out for yourself, and in the meantime let us send our catalogue.

Made in sizes from 24-inch to 84-inch wide.



The Cincinnati Planer Co., Cincinnati, Ohio

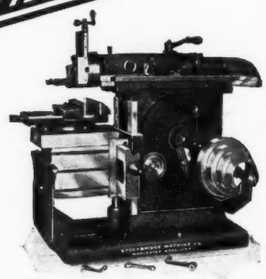
FOREIGN AGENTS—Ludw. Loewe & Co., Berlin and Paris. Vaghi, Accornero & Co., Milan. R. S. Stokvis & Zonen, Rotterdam, Holland. J. Lambercier & Co., Geneva, Switzerland.



That Patent Crank Motion as applied to Stockbridge Shapers gives a perfect crank motion, increasing production to a point where there is no economy in

Stockbridge TWO-PIECE Crank Shapers

running that old plain crank shaper. Better by far to scrap it.



Stockbridge Machine Co.
WORCESTER, MASS., U. S. A.

Special Attachments

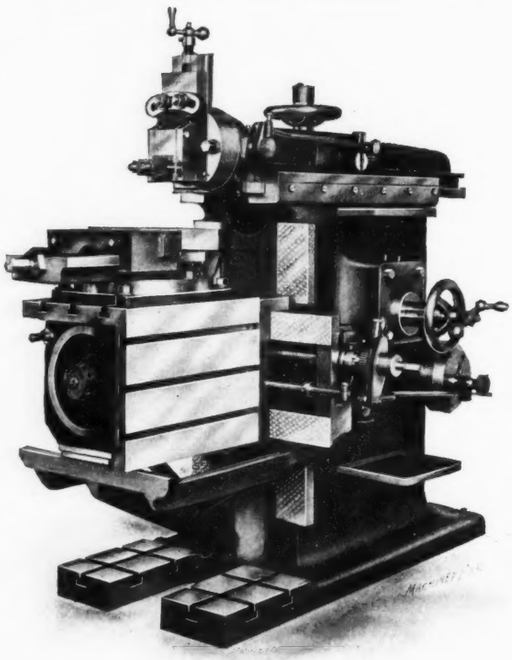
Swivel Box Table

Tilting Box Table

Circular Planing Attachment

Convex Planing Attachment

Oil-Pan and Pump



Special Attachments

Concave Planing Attachment

Automatic Stop for Saddle

Rack-Cutting Attachment

Index Centers

Special Tool Room Shaper with Attachments

Printed matter on request

The Mark Flather Planer Co., Nashua, N. H., U.S.A.

VC FOR QUALITY

Automatic Friction Feed

Automatic Stop

Power Return

The Higley Metal Saws

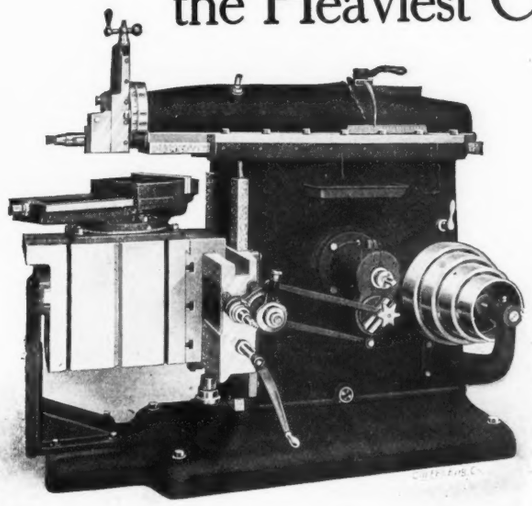
ARE EFFICIENT AND ECONOMICAL

"Higley" drive means thin saw blades pulled through the work, less stock removed and less power required. Result, the fastest cuts on record.

Vandyck Churchill Company

New York Philadelphia Pittsburgh New Haven

The Queen City Shaper has Power to Handle the Heaviest Classes of Work



and is especially suited for severe continuous service. For railroad work and heavy machine shop duty a 24-inch Queen City Back-geared Shaper can hardly be equalled. The arched construction of the ram adds to the strength and rigidity of the machine, as does also the very heavy rail, and ample wearing surfaces. The ratio of back-gearing is 29 to 1 giving full benefit from high speed steels. The workmanship throughout is the best, and convenience in operating is an important consideration. All changes—speed, stroke, feed, etc., are made from the working side of the machine, a handle for shifting from single to back-geared and vice versa is located just above the cone pulley; the table has outer support, and the improved telescopic screw makes cutting a hole in the floor unnecessary.

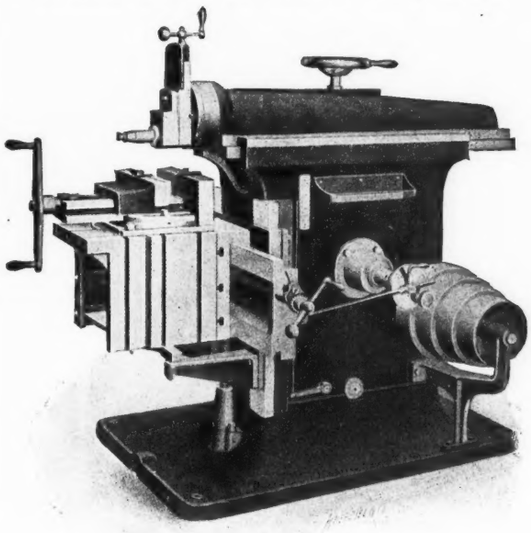
We also build this Shaper in 16-in. and 20-in. sizes and shall be glad to send catalogue.

Queen City Machine Tool Co., Cincinnati, O., U. S. A.

FOREIGN AGENTS: J. Lambercier & Co., Geneva, Switzerland; DeFries & Co., Dusseldorf and Berlin, Germany; Paris, France; Milan, Italy.

Kelly 26-inch. Shaper

Back Geared or Plain Just as You Prefer or Your Work Requires.

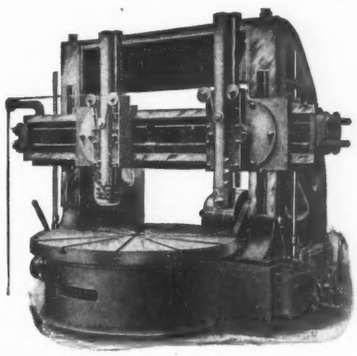


Adapted for severe service. Strong and Durable. Eight cutting speeds without stopping the machine. Equal rigidity on long or short stroke. Table support a part of the machine.

Write for Crank Shaper Catalogue.

15, 17 and 20" stroke Plain.
16, 20, 24 and 26" stroke Back Geared.

THE R. A. KELLY CO., Xenia, Ohio



The Power is There—

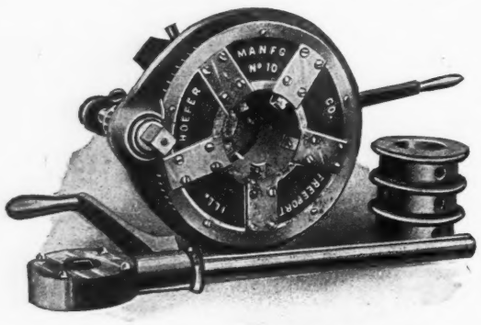
Power and rigidity are strong points in the construction of **Poole Boring Mills,** ensuring the best results from high speed steels every time. They are built for heavy work and handle it rapidly and accurately. Every facility for ease in operating.

Four sizes, 6, 7, 8 and 10 foot. Power traverse for cross-rail, cross-heads and tool bars. Twenty-four changes of speed; eight universal feeds.

Full description of any or all sizes if you will ask for it.

The J. Morton Poole Company
WILMINGTON, DEL.

AGENTS: Prentiss Tool and Supply Co., 115 Liberty St., New York, 145 Oliver St., Boston, 507 D. S. Morgan Bldg., Buffalo. Hill, Clarke & Co., Chicago. W. C. Johnson & Sons M'chy Co., St. Louis. Tatum & Bowen, San Francisco.



Adjustable Hand Power Pipe Threading Machine.

The New Hoefer Pipe Threading Machine

has special advantages for work within its range. It is a hand power machine, adjustable, and can be operated by one man. It will thread pipes of any material; dies are fed forward and automatically withdrawn; can be quickly adjusted to cut over or under size and one set of dies will cut all sizes of threads within the capacity of the machine.

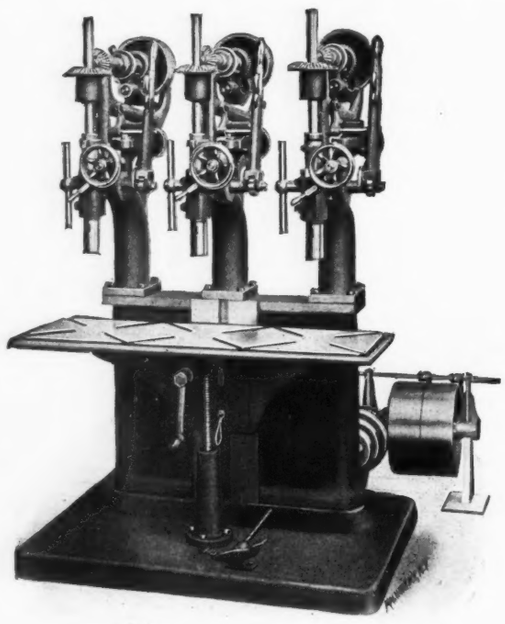
We manufacture **Drill Presses, Metal Saws, Horizontal Drilling and Boring Machines, Vertical Boring Machines, Wire Straighteners, Pipe Threading Machines, Furniture and Bed Spring Machinery.**

SEND FOR LATEST CATALOGUE.

Hoefer Manufacturing Company

Cor. Chicago and Jackson Sts., Freeport, Ill.

FOREIGN AGENTS—C. W. Burton, Griffiths & Co., London, England. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. J. Lambercier, Geneva, Switzerland.



24-inch Gang Drill.

Automatic Gang Drills

BUILT FOR BUSINESS

Our Manufacturers Drills will do your work surprisingly quick, pleasingly accurate and with a big saving in operative cost. One man does the work of four to six operators. No feed levers—spindles are automatic. The operator is kept busy feeding the machine with work. No time is lost on the part of either the machine or the operator.

Built in 14 inch, 20 inch and 23 inch sizes—all cost reducers and profit producers.

Want to know more about these machines and who are using them? Let us tell you.

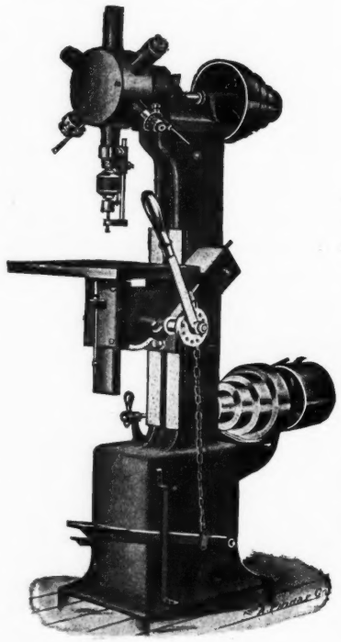
B. F. Barnes Company, Rockford, Ill.

European Branch: 149 Queen Victoria St., London, E. C.

Quint Turret Drills

Do all the work—Bore, Drill, Tap—and all at one setting of the work.

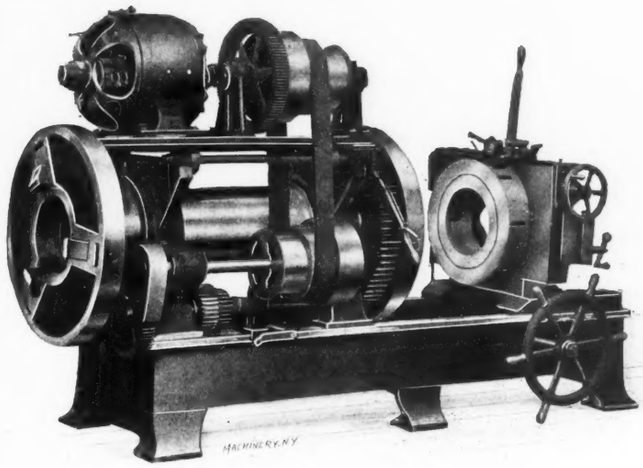
The No. 2 Pattern as shown is arranged for tapping, and is especially adapted for light work where accuracy is essential. It will drill to $\frac{5}{8}$″ and tap to $\frac{1}{2}$″, without stopping to change work or tools. Positively driven with steel bevel gears. Reversing Tap Holder will tap to required depth and automatically back out more than twice as fast as when cutting. Independent stops for depth of holes. Made with from 4 to 12 spindles.



Catalogue for full description.

A. E. Quint, Hartford, Conn.

Duplex Threading and Cutting-off Machine with Motor Drive



This is the

Improved Duplex, No. 12

It has capacity for threading and cutting-off pipe from 4″ to 12″ inclusive, and is one of the most rapid and convenient machines of its type.

The die head is simple but effective; all adjustments are made by hand and dies may be inserted without removing any of the parts. Front and rear chucks are interchangeable; the reaming tool is located on the cutting-off slide; and handling small pipe is facilitated by a special bushing furnished with the machine.

We make a full line of Pipe Machines and shall be glad to forward circulars.

Bignall & Keeler Mfg. Co., Edwardsville, Ill.

HAVE YOU EVER THOUGHT OF THIS?

A makes gears.
B makes cutting tools.
C makes castings.
D has an idea for a pipe threading and cutting machine. He cannot make the different parts because he don't know how. He can only put them together.
He buys the base from C; the tools from B; the gears from A and other parts from E, F, G, and other manufacturers.
He has his men set up the machine. It runs, anyhow—anyway.
It looks rather nice.

BUT WILL IT DO THE WORK?

Can you trust that machine? Can you depend upon each and every part to do its full share of work and not shirk?
Can you depend upon the assembler of that machine to stand behind each and every part? Can you get satisfaction from him if it breaks? You know the answer.

MERRELL PIPE THREADING AND CUTTING MACHINES

must do the work or they cost you nothing.
We make each particular part and stand behind the whole machine. We are a responsible company.
We're so sure it will do the work that we give it to you for full 30 DAYS ABSOLUTELY FREE TRIAL.
Some pipe threading machines are built today as they were twenty years ago. Not an important improvement.
The MERRELL is an old—yet new—machine. We are the oldest sole makers of pipe threading machines in existence today. Yet we make our machines better each year.
Will you let us show you where and why MERRELL machines are best for you—without charge to yourself?
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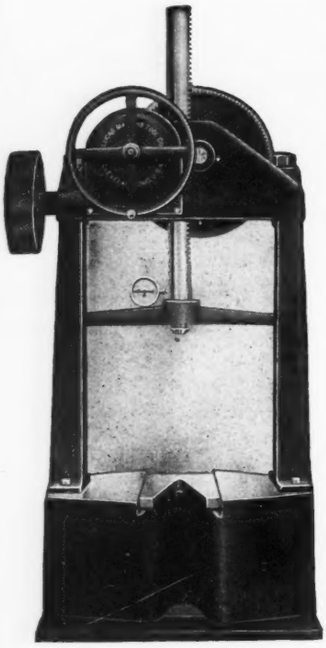
or ask your man to break his when it is possible to get such a machine as the



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which will do your bending, broaching, straightening, forcing of arbors, pins or bushings in and out of holes

CHEAPER, BETTER AND QUICKER

than a hand press. A gage tells the pressure you get.

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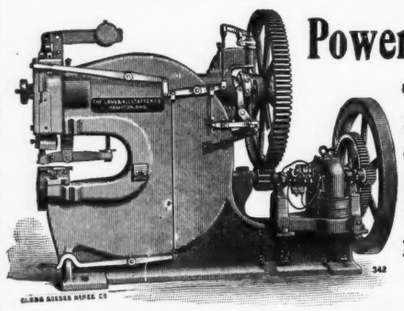

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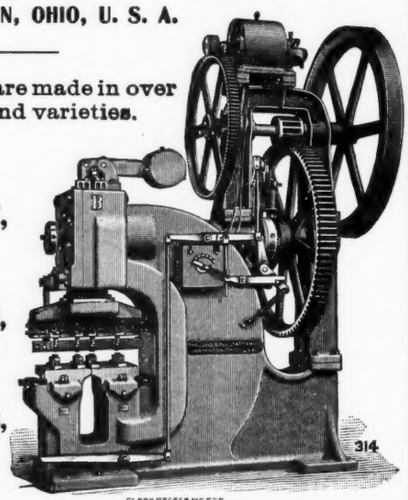

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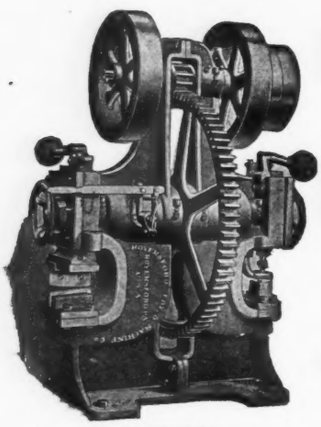

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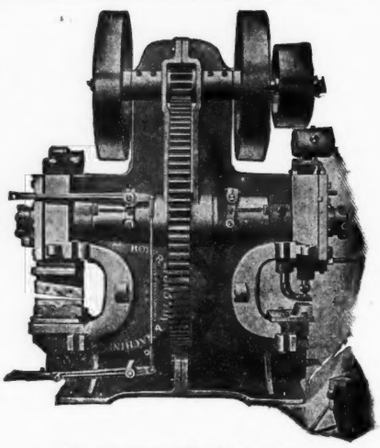

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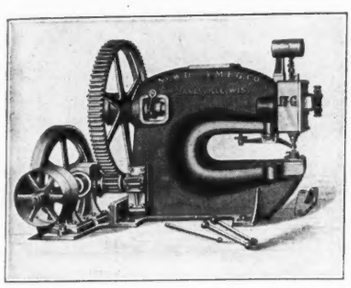
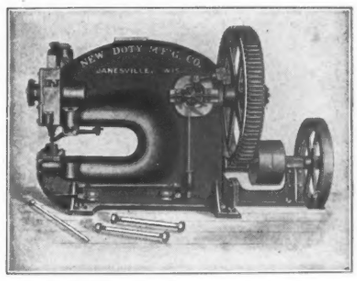


ALL SIZES AND CAPACITIES



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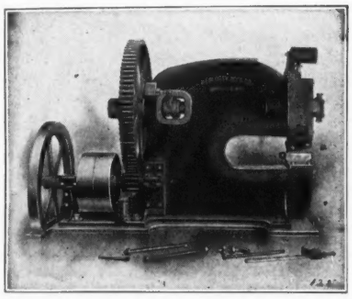

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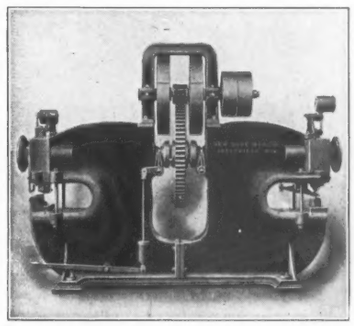

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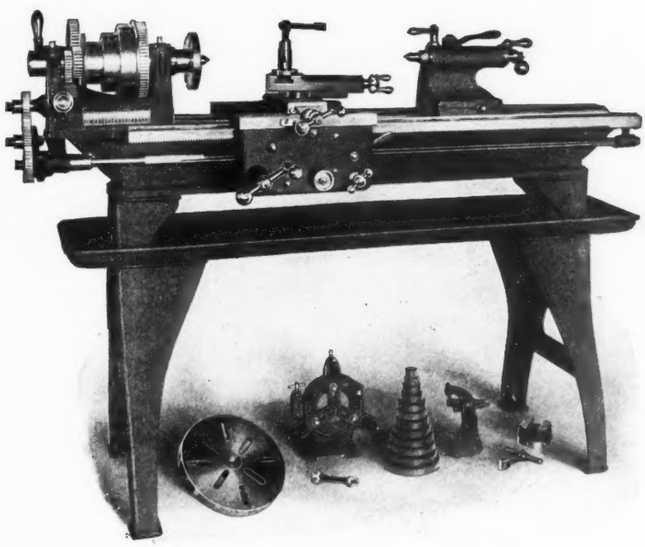

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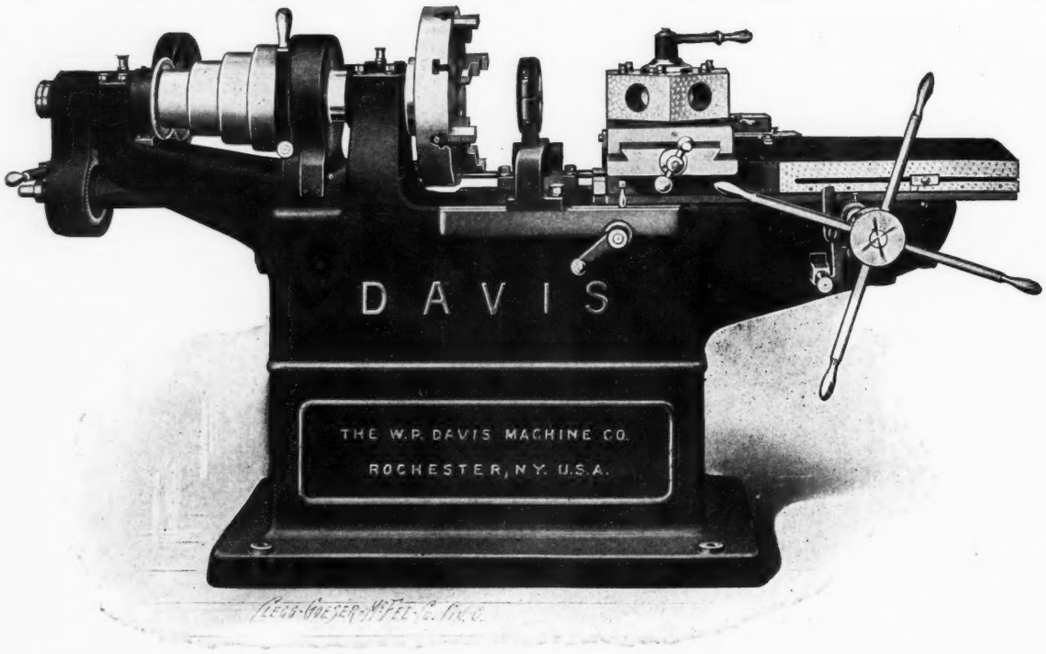

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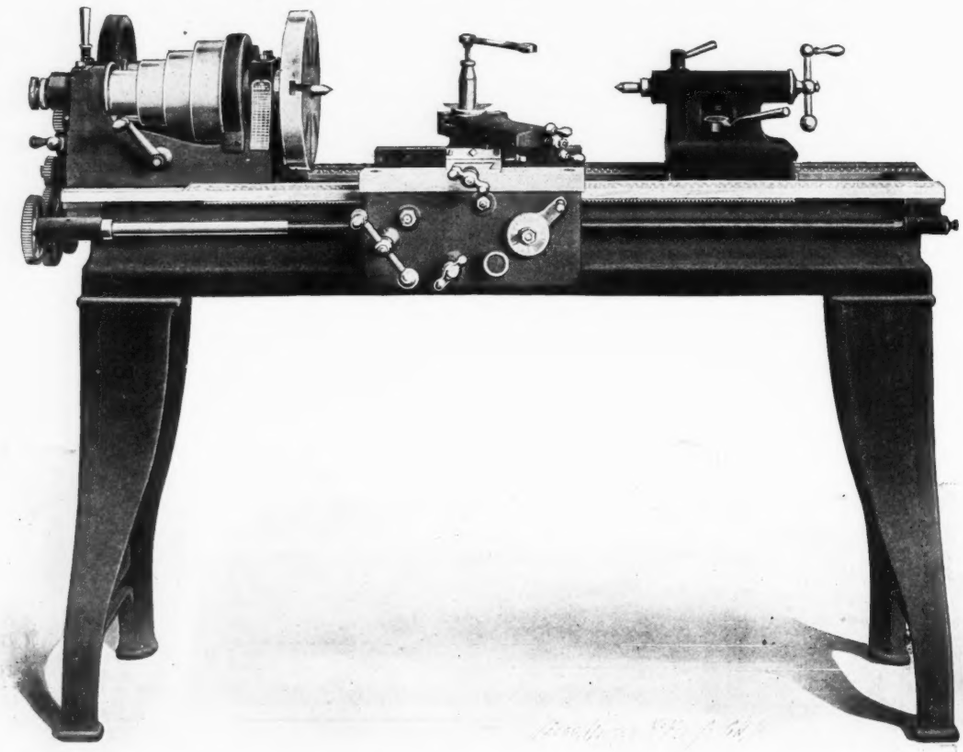
With Geared Friction Head and Power Cross Feed to Turret.



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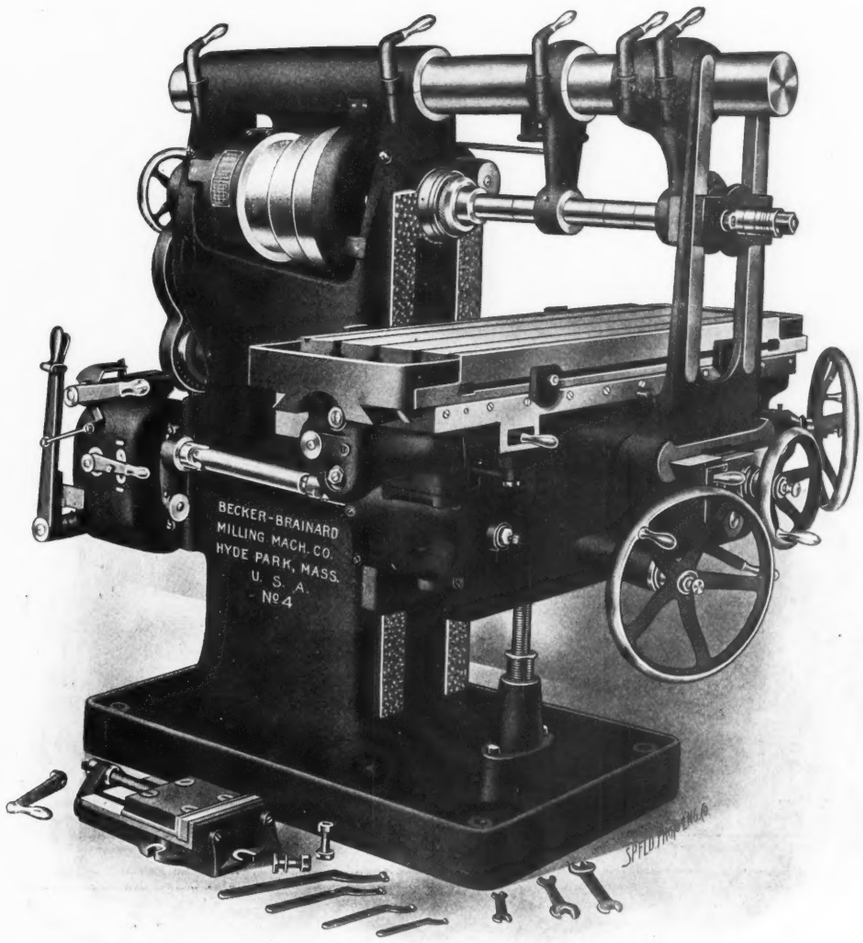

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One of the advantages you gain with our No. 4 Plain Milling Machine and we shall be glad to point out other important improvements.

This powerful Miller is double back-geared and particularly adapted for heavy work. The geared-feed drive gives the required positiveness and power for work of this character, the patented change feed mechanism, conveniently arranged on the back of column, makes 20 changes of feed, slow or fast, instantly obtainable; a simple movement of the lever accomplishing this without stopping the machine. The knee, of box type, is supported by telescopic elevating screw, hand wheels for operating the feeds are provided with a clutch mechanism enclosed in the hub; the arm is of steel, arranged for horizontal adjustment; belt or motor drive. The word "DAGSTAR" on a postal with your address means better profits. Write it now.

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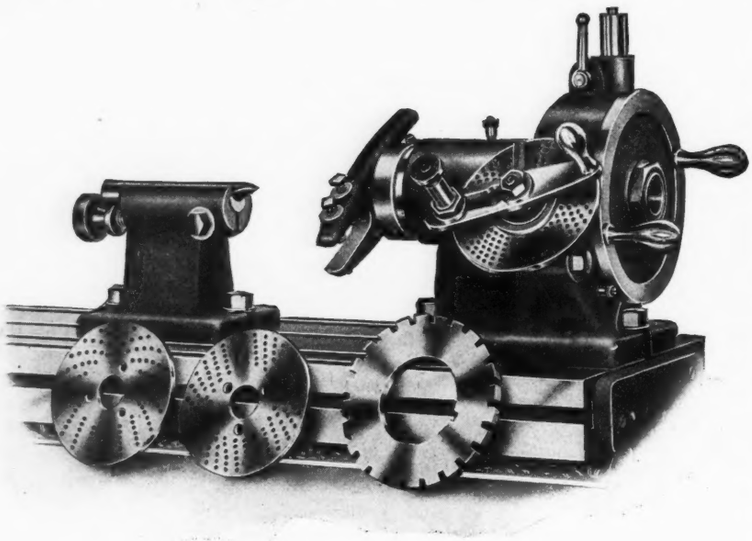

Simple yet complete with double system of indexing—change from one to the other made instantly.

The notched plate is made of hardened tool steel with the notches carefully ground. One plate with 24 notches furnished but other numbers are constantly in stock for immediate shipment.

The three index plates furnished for worm wheel dividing give all numbers to 50 and all but prime numbers beyond.

All working parts are perfectly covered and the worm runs in oil. We are cranks on automatic oiling and on the thorough protection of working parts from dirt and injury. This is the reason why so many are saying,

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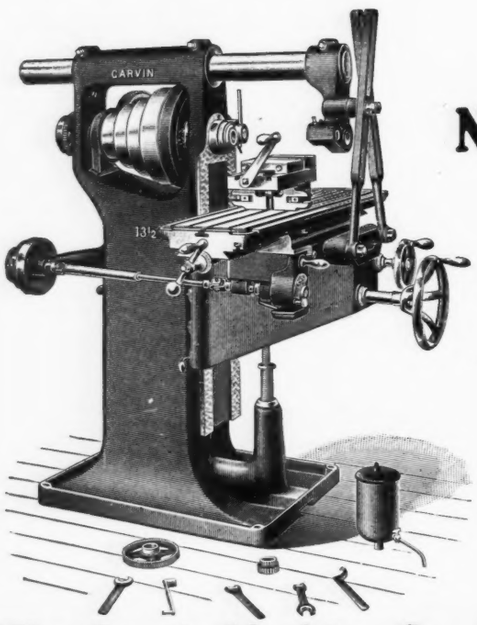

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Ready for Delivery

Especially adapted for Fine Manufacturing Tool and Jobbing Work.

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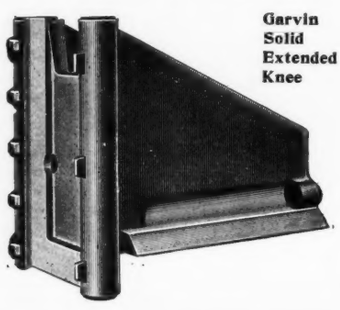

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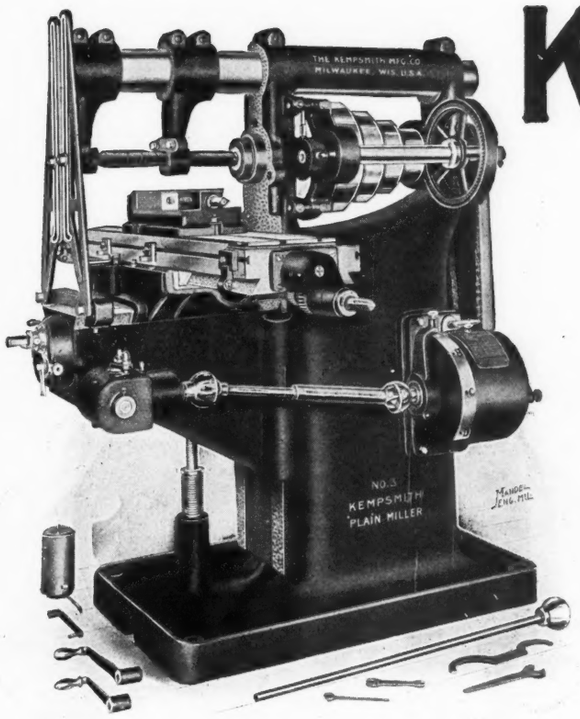

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Let us show the details.

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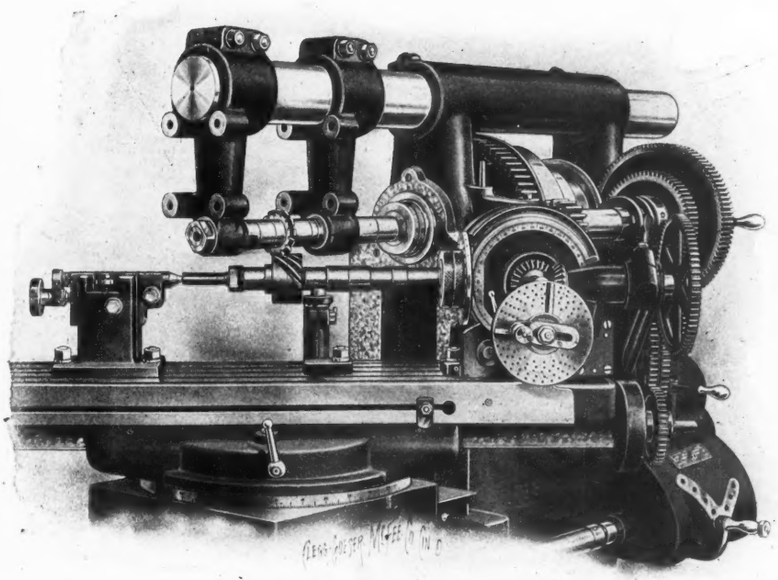
The Original Double Friction Back Geared Miller



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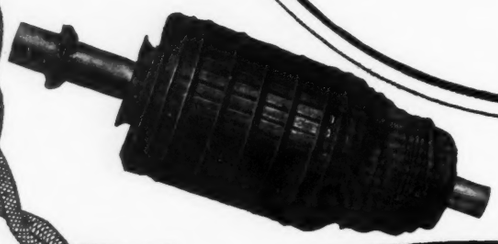

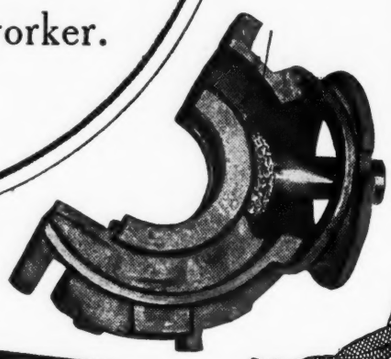

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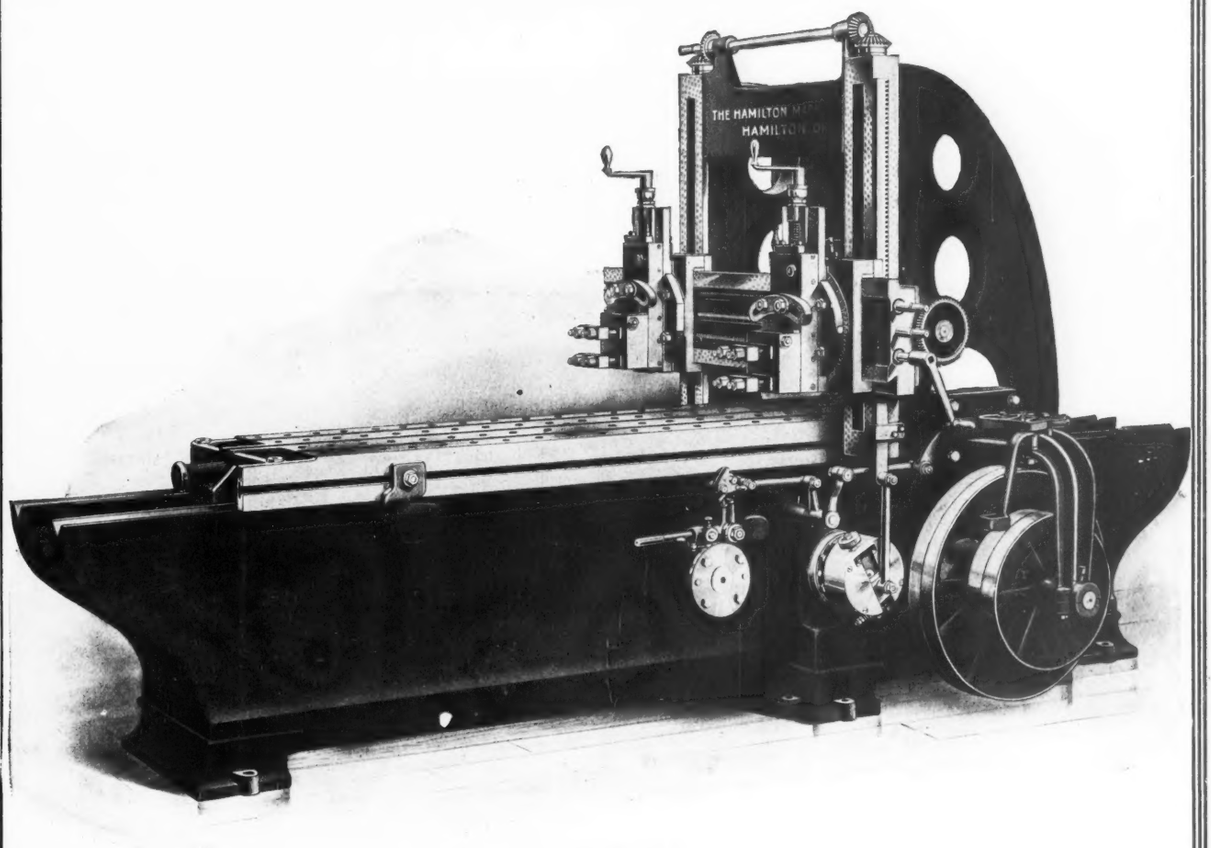

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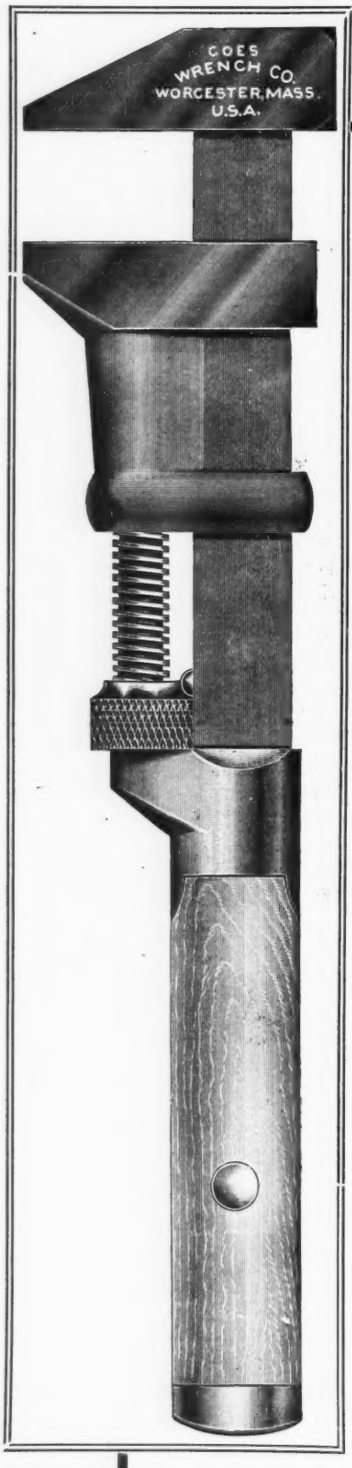

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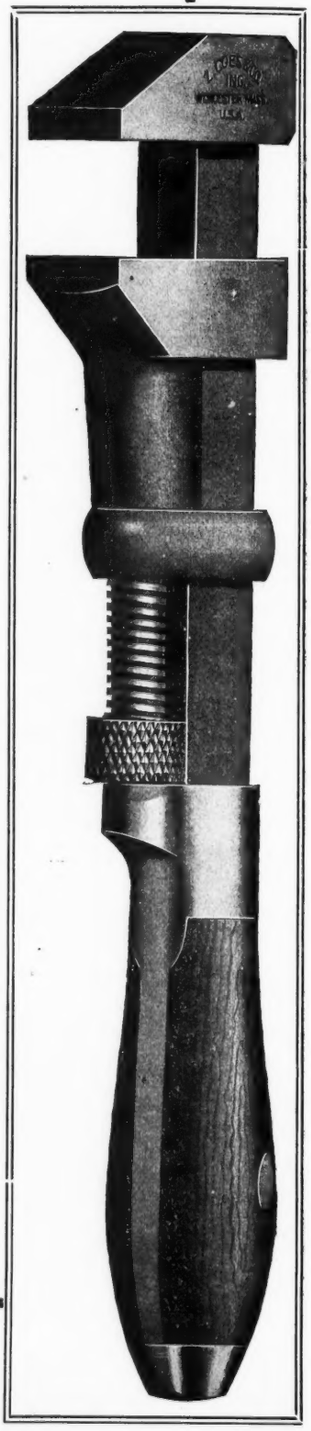
The "Knife Handle and The "Hammer Handle"

One supplements the other and both are the best of their kind

The Coes line of wrenches is so well known for uniform excellence that a new tool of this make needs no other recommendation than the familiar trade mark to assure its warm reception. The "Hammer Handle", the latest aspirant for honors, has all the strength and other advantages of the Steel Handle wrench for heavy work and is fitted with a hard wood handle—particularly heavy—of a size to fill the hand perfectly and give a firm grip. The handle is so secured to the bar that it may be practically considered an inseparable part of the tool. Wrench has ball bearing screw, extended jaw support, heavier parts in jaw and bar, and every feature of construction insuring long life and long service. Three sizes—15, 18 and 21-inch now ready. The "Knife Handle" model is furnished in seven sizes, 6, 8, 10, 12, 15, 18 and 21-inch—bright or black.



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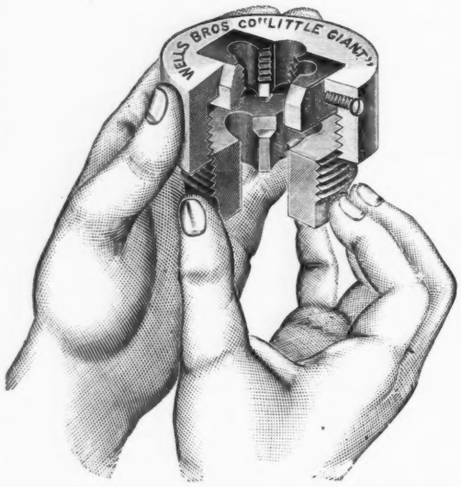

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Manufactured by

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Sizes include 1″ to 12″ gauges. They are always in place, always ready, and 12 men can be provided with a reliable caliper at one time.

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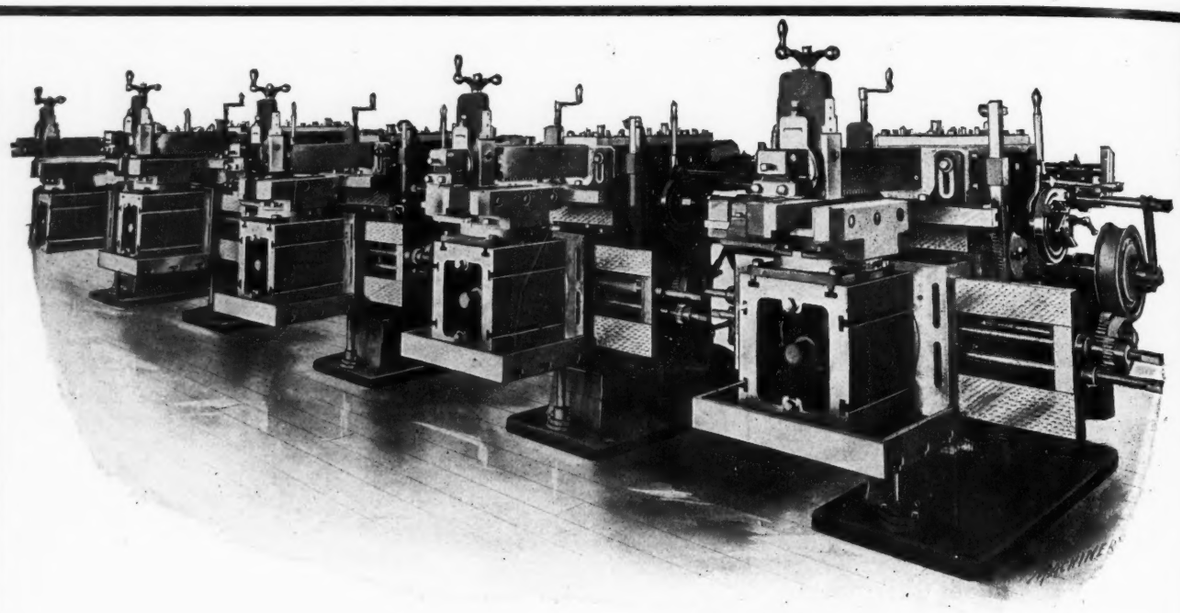


One Shipment of Morton's 24-inch Stroke Draw Cut Shapers, to one of the largest Railroad Companies in the world.

MORTON'S DRAW CUT SHAPERS

Especially designed for railroad work and the most efficient, rapid and durable tools of their class. These Shapers will plane the driving boxes complete, plane shells, steam chest covers, eccentrics and other parts of the locomotive in less time than can be done by ordinary methods. They are very powerful, designed for high speed steels and equipped with special attachment for planing connecting rod brasses, etc. *Send for full description and photographs.*

We also build Traveling Head Shapers.

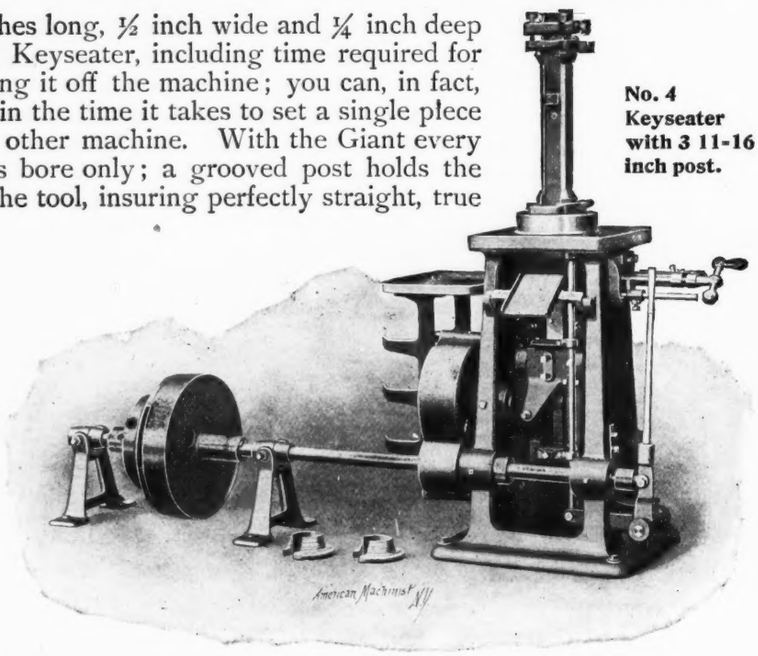
Morton Mfg. Company, Muskegon Heights, Mich., U.S.A.

Six-inch Keyseats in Two Minutes

You can cut a keyseat 6 inches long, ½ inch wide and ¼ inch deep in two minutes on the Giant Keyseater, including time required for putting the work on and taking it off the machine; you can, in fact, *finish* two ordinary keyseats in the time it takes to set a single piece ready for keyseating on any other machine. With the Giant every job is set and fastened by its bore only; a grooved post holds the work and forms a guide for the tool, insuring perfectly straight, true keyseats whether the hole is straight or taper, or whether the hub is faced true or left rough as it comes from the foundry. This feature alone represents a saving that will soon cover the cost of the machine.

Giant Keyseaters are built in six sizes, cover a wide range of work and are easily and quickly adjusted to different requirements.

Catalogue mailed on request.

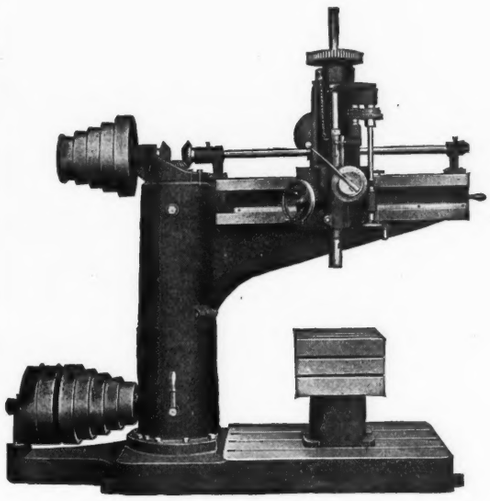


No. 4 Keyseater with 3 11-16 inch post.

Mitts & Merrill, 843 Water Street, Saginaw, Mich., U. S. A.

FOREIGN AGENTS—C. W. Burton, Griffiths & Co., London, England. Penrhyn Neville, Milano, Italy. Alfred H. Schutte, Barcelona, Spain. Schuchardt & Schutte, Vienna, Austria. Heinrich Dreyer, Berlin, Germany. E. H. Hunter & Co., Oaska, Japan. Palmer & Co., Wellington, New Zealand.

For Many Classes of Work



The chief characteristics of this machine are rigidity, simplicity and durability, which combined with a high ratio of transmission gears make it admirably adapted for many classes of work—it being particularly effective for heavy drilling and tapping—our 4 ft. size back-geared machine being able to pull a 6″ tap through cast iron at 11 revolutions of spindle per minute.

Send for Circular.

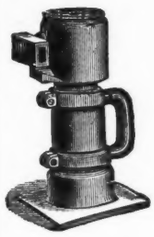
The Bickford Drill & Tool Co.

Send for Drilling Extraordinary.

Cincinnati, Ohio, U. S. A.

Send for 56 Points of Vantage.

FOREIGN AGENTS—Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg, New York. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, New York. Charles Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Andrews & George, Yokohama, Japan. H. W. Petrie, Toronto, Canada. Williams & Wilson, Montreal, Canada.
S. R.—4.



What do you Lack in our Line?

We make Hydraulic Tools of every description and for all needs, but among the hydraulic jacks the latitude in the matter of choice is perhaps greatest—257 styles, and every one of them built to meet the demands of the severest service. Ably designed, strongly built, long wearing tools.

JACKS

When you write us about jacks, you might as well get some points on other tools you may need later on. Special catalogues of Presses, Pumps, Punches, Shears, Benders, Valves, Accumulators, Gauges, Fittings, Tube Expanders. We build special tools to order.

The Watson-Stillman Company,

26 Cortlandt St., New York, U. S. A.

Chicago Office, 453 Rookery.

Here's a Row of First Class
Machines for all Power Purposes

Sterling in Quality as well as in Name

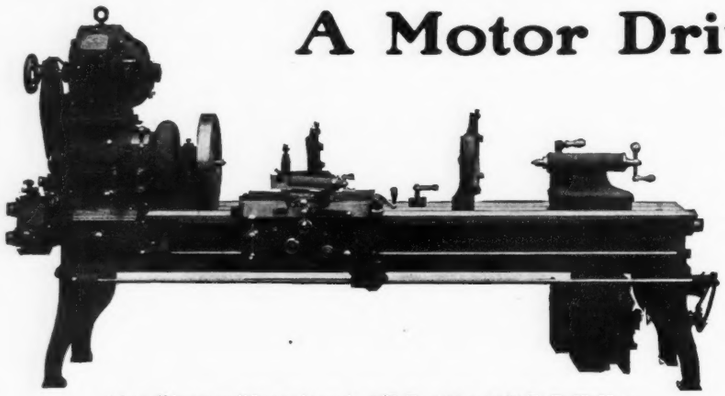
Generators, Dynamotors, Vertical Motors— All Speeds and Voltages

STOCK CARRIED IN NEW YORK AND ST. LOUIS

The Sterling Electric Motor Co., Dayton, Ohio

Engineering Specialty Co., 143 Liberty Street, New York, Eastern Representatives.

A Motor Driven Lathe



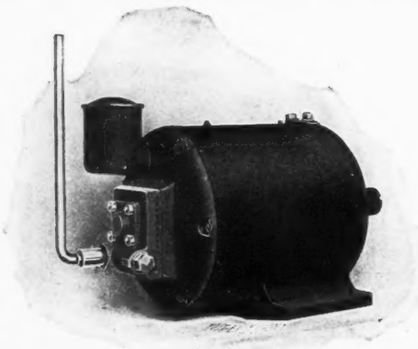
18-in. "American" Lathe driven by 3 H. P., 450 to 1800 R. P. M. Motor.

Has "the call" over a belt driven machine every time and when the motive power is a **Thompson-Ryan Variable-Speed Motor,** the equipment approaches the ideal.

Some advantages of the Thompson-Ryan are: Wide range of speed variation. Field control, requiring no complicated controller or complex wiring. Sparkless commutation. Uniform speed.

Write for bulletin on machine tool drive.

Ridgway Dynamo & Engine Co.
Ridgway, Pa.



Back Geared Air Motor

SHEPARD PNEUMATIC MOTORS afford satisfactory means of easily applying power to hand cranes.

These motors are built in 2 H. P. and 5 H. P. sizes, with driving shaft speeds of 95 and 80 R.P.M. respectively. A powerful friction clutch is interposed between motor and back gearing, which prevents injury from overrunning. Compact, liberally proportioned, highly efficient.

Dust Proof. **Oil Bath Lubrication.** **Fool Proof.**

THE GENERAL PNEUMATIC TOOL COMPANY

NEW YORK, Singer Building — General Offices and Works, MONTOUR FALLS, N.Y. — PHILADELPHIA, Stephen Girard Bldg.

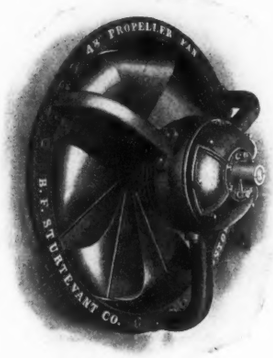
The Brophy Endless Belts

Have all the advantages desirable for high speed machinery and none of the "outs" so prominent in belts of leather and other materials. Woven endless there is no joint to cause the jar or jump so injurious to rapid running machines; they are uniform in thickness, particularly strong, are not affected by heat, oil or water, will not stretch, will not rot nor become hard, and once adjusted can be run continuously without further attention.

BROPHY ENDLESS COTTON BELTS will increase power and productive capacity, wear longer and are guaranteed to save fully 25 per cent. in time and labor over other belts. *Booklet with full description mailed on request.*

CREAMERY BELTING & SUPPLY CO., Hinsdale, Ill.

Ready for a Hurry Call



Sturtevant Electric Propeller Fans are carried in stock at works, and at our New York, Philadelphia and Chicago warerooms. Especially suited for summer ventilation.

B. F. STURTEVANT CO., Boston, Mass.

General Office and Works, Hyde Park, Mass.

New York **Philadelphia** **Chicago** **London**

Designers and Builders of Heating, Ventilating, Drying and Mechanical Draft Apparatus; Fans, Blowers and Exhausters; Steam Engines, Electric Motors and Generating Sets; Fuel Economizers, Forges, Exhaust Heads, Steam Traps, Etc.

458

Motors for Rolling Mills

During August we shall distribute our New Bulletin No. 66 R, describing the Form W Motor, especially designed for the excessively hard service of rolling mills.

CROCKER-WHEELER CO., Ampere, N. J.

There is a Sharpness and Finish

about name plates, type wheels, advertising novelties, specialties, small machine parts, etc., which are **"Die Cast"** by our method, that gives them a superior appearance quite equal to their superior quality. There is also a superior economy if you need them in quantities.

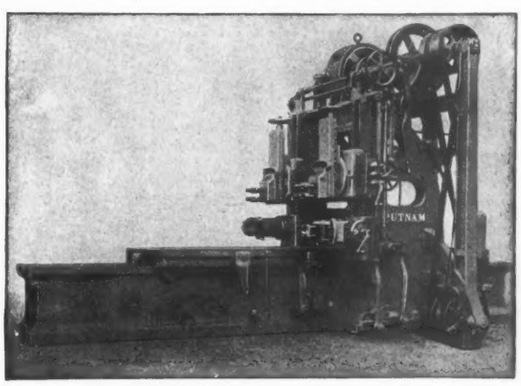
Write for a sample **Franklin Finished Casting** and a few details of what we can do in this line of work.

Franklin Mfg. Company

203 So. Geddes Street, SYRACUSE, N. Y.

Always Investigate "Quality"

When considering the qualifications necessary in a motor, for a given class of work.



Westinghouse Type S Motor Driving Putnam Planer

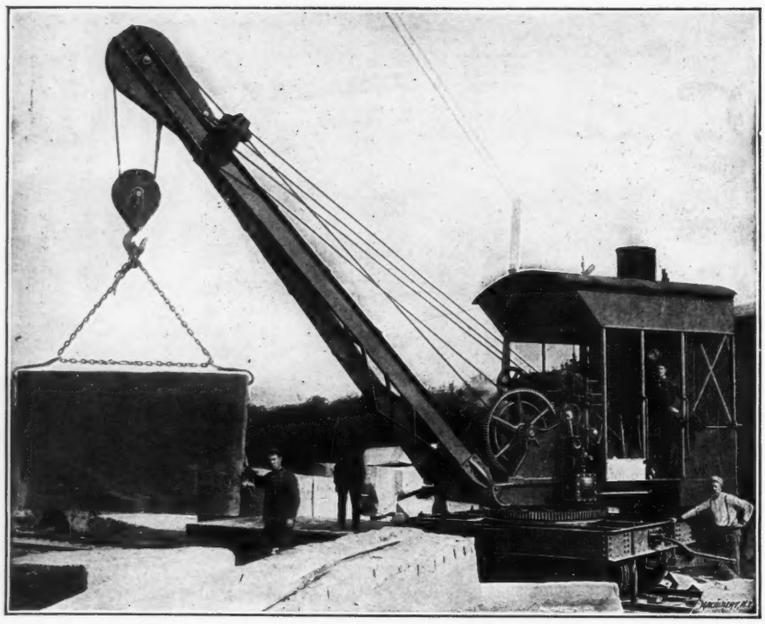
The Westinghouse Motor Qualities which tell in machine tool drive are:

Rigid construction—heavy shafts—split and interchangeable bearings, with two oil rings in each. Bearings may be removed for replacement without disturbing pulley. Shunted brush holders and perfect brush holder adjustment. Water and oil proof field coils.

Westinghouse Electric & Mfg. Co.

Sales Offices in all Large Cities. PITTSBURG, PA.

For Canada: Canadian Westinghouse Co., Limited, Hamilton, Ont.



Many Firms have found a

BROWN HOIST

Locomotive Crane

the most profitable tool about their yards. Equipped with grab buckets or without. We would be pleased to demonstrate their utility to you.

THE BROWN HOISTING MACHINERY CO.

Manufacturers of Hoisting Machinery for all Devices.

OFFICE AND WORKS, CLEVELAND, OHIO, U. S. A.

BRANCHES: PITTSBURG AND NEW YORK.

CRANES and HOISTS

Awarded **GRAND PRIZE** at Louisiana Purchase Exposition.

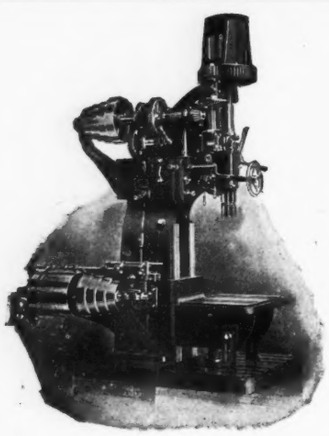
We have built **1700** of these **PROFIT PRODUCING EQUIPMENTS** for all kinds of requirements. Capacities from 1 to 200 tons.

Awarded **GOLD MEDAL** at Louisiana Purchase Exposition.

ELECTRIC TRAVELING CRANES.
HAND TRAVELING CRANES.
TRAVELING WALL CRANES.
LADLE CRANES.

PAWLING AND HARNISCHFEGER
MILWAUKEE, WIS.

ELECTRIC HOISTS for I-BEAM RUNWAYS.
HOIST TRANSFER CRANES.
I-BEAM TROLLEYS.



YOU BUY THE BEST

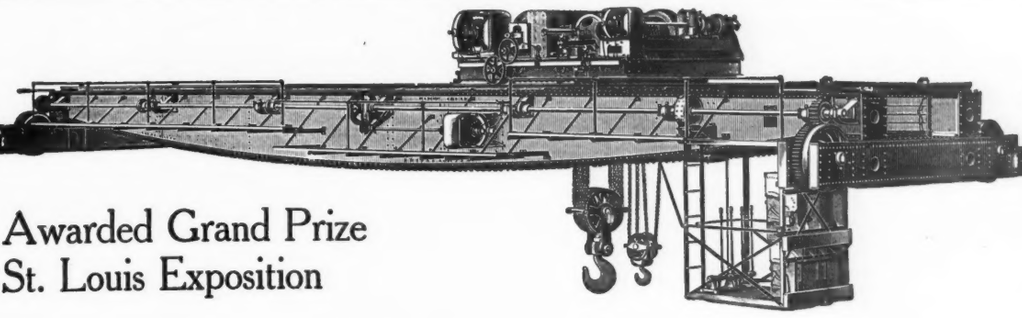
When you buy our Tapping Machine for pipe fittings and flanges, with geared feed corresponding to lead of tap and automatic air shifting device for belts.

We also build a fine line of

Keyseaters,
Drilling and Boring Machines for Heavy Work,
Car Wheel Borers,
Heavy Double Rod Drills,
Draw Stroke Slotters,
Universal Saw Benches.

Baker Brothers, Toledo, Ohio, U.S.A.

AGENTS: Marshall & Huschart Mchy. Co., Chicago, Ill. Motch & Merryweather Mchy. Co., Cleveland, O. Brentiss Tool and Supply Co., New York City. Baird Mchy. Co., Pittsburg, Pa. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona. Chas. Churchill & Co., London, Manchester.



Awarded Grand Prize
St. Louis Exposition

The Shaw Electric Traveling Crane

MANUFACTURED BY

THE SHAW ELECTRIC CRANE COMPANY, MUSKEGON, MICH.

This company manufactures its own Bridges, Motors, Controllers and other Electrical Appliances. Suitability of design, high grade materials and best workmanship are thus assured. Accessibility and durability are two essential features embodied in Shaw design.

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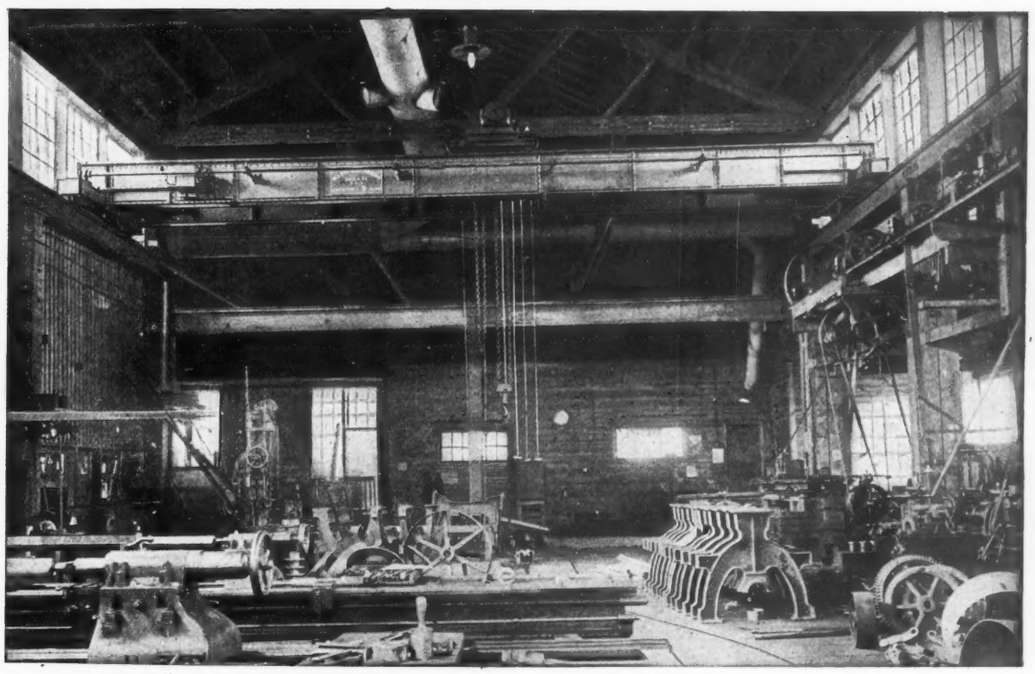


2-Motor Crane at Downington Manufacturing Company, Downington, Pa. Eight Cranes in this plant.

HAND TRAVELING CRANES

For Machine Shops, Power Plants, etc.

MARIS BROS., 56th and Gray's Avenue, Philadelphia, Pa.

Manning, Maxwell & Moore, Inc., Agents, New York, Pittsburg, Boston, Chicago, Cleveland.

Counting the Cost

Is a big item in the busy factory. The labor cost of production has an immense bearing on the profits, and too much care cannot be used to have the records accurate.

The CALCULAGRAPH

keeps a clear, accurate record of every piece of work from start to finish, and furnishes a permanent record of each job in convenient form for reference. It takes the place of an expensive clerk, saves the time of the busy workman, and being mechanical, can make no clerical errors. The CALCULAGRAPH mechanically subtracts the time a man begins his work from the time he finishes it, printing the actual working time. Think it over a little, then let us send you full description of the machine.

CALCULAGRAPH COMPANY
1441 Jewelers' Building, NEW YORK, U.S.A.

The Peerless Hoist

IS A PRACTICAL ECONOMY FOR YOUR PLANT.

It is always ready, can be operated by unskilled labor, works faster, easier, and has a higher factor of safety than any other hand hoist.

The single load chain is an advantage — fewer strands of chain—and the compact form and light weight are further points of favor. It is spur-geared, insuring free, smooth action; durable, all working parts enclosed in dust-proof cases, and provided with an automatic clutch for holding the load at any point.

Suited for the hardest service.
Write for further details.

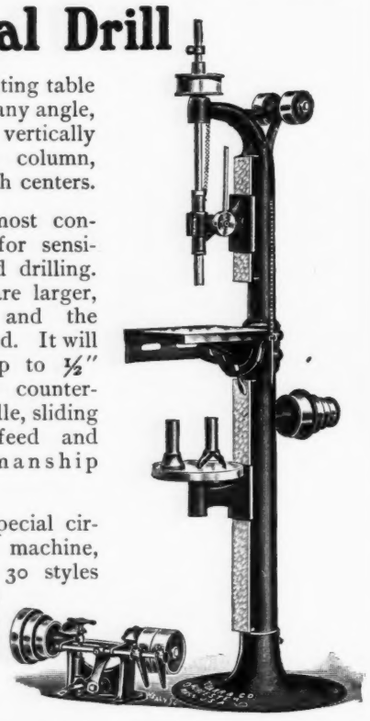
Edwin Harrington & Son, Inc.
PHILADELPHIA, PA., U. S. A.

No. 4 Fourteen Inch Vertical Drill

with square tilting table for drilling at any angle, round table, vertically adjustable on column, cup and crotch centers.

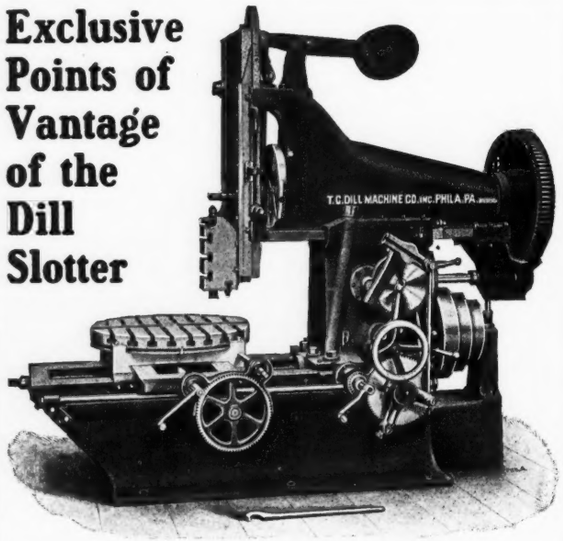
One of the most convenient tools for sensitive and rapid drilling. The pulleys are larger, belts longer and the power increased. It will drill holes up to ½" diameter, has counterbalanced spindle, sliding head, lever feed and finest workmanship throughout.

Write for special circular of this machine, one of over 30 styles Single and Multiple Drills manufactured by



H. G. BARR, Worcester, Mass.

Exclusive Points of Vantage of the Dill Slotter



Traveling Head.
Improved Quick Return.
Quick Traverse Gear.
Wide Range of Speeds.
New Intermittent Feed.
Table Graduated in Degrees.
Hand Wheel Controller.
Tool Post in Relief Apron.

And other features of construction that make it a power for the machine shop.

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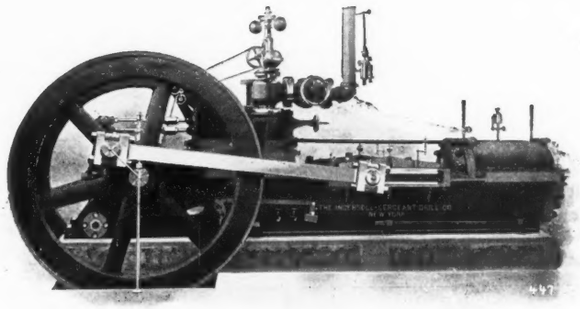
The Dill Slotter People
Philadelphia, Pa., U. S. A.

STRAIGHT-LINE
AIR COMPRESSORS



CLASS "A"

Simple in Design, with minimum number of parts and direct, positive application of power to resistance.

Self-Contained in type, permitting the simplest foundation, with low cost of installation.

Completely Accessible in every part, permitting inspection and adjustment without the removal of any part.

Easily Managed, ensuring high class results over long periods without expert attendance.

Self-Regulating under all variations of load and operating conditions.

A Superior Type for all purposes demanding moderate capacity, good economy, great reliability and moderate cost of installation and up-keep.

PNEUMATIC TOOLS

INGERSOLL-RAND CO.

11 Broadway, NEW YORK

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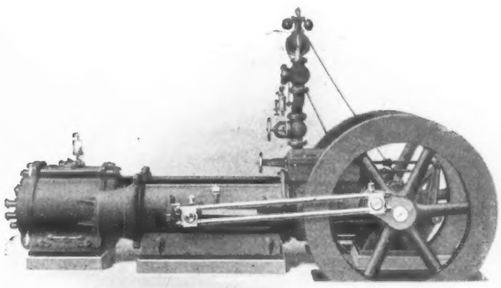
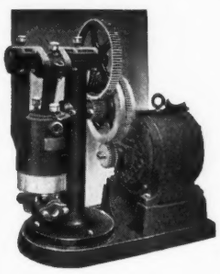


CLASS "RC"

K 24



AIR COMPRESSORS

Capacity 1 to 70 cubic feet free air per minute.

BELTED MOTOR DRIVEN Single and Three Cylinder Styles

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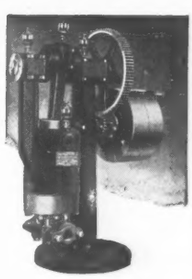
THE F. W. SPACKE MACHINE CO.

INDIANAPOLIS, IND., U. S. A.



GEAR CUTTING - SPROCKET CUTTING

We maintain a special department for this division of our business. - Let us furnish estimates.

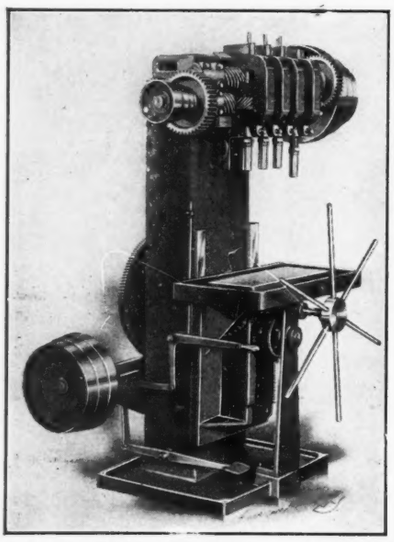
The King Machine Tool Company.

CINCINNATI, OHIO, U. S. A.

VERTICAL TURRET BORING AND TURNING MACHINES

THE VERY POWERFUL GEARED FEED

is a feature of our new



No. 7 Gang Drill

This machine has capacity for drilling ¾" holes within 2½" of each other and adjusts out to 20". The spindles are vertically adjustable, run in bronze bushings and are driven by bronze spiral gears; table is counterbalanced, with automatic stop and quick return; three changes of feed and three speed changes. Distance from nose of spindle to table 17".

Write for full description.

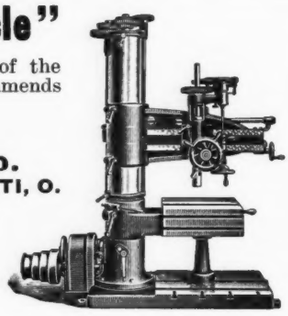
MOLINE TOOL COMPANY, MOLINE, ILL.

Marshall & Huschart Machinery Co., Chicago Representatives.
Chandler & Farquhar Co., Boston Representatives.

"Swinging Round the Circle"

The arm making a full circle is only one of the features of the **Mueller Radial Drill** that recommends it above similar machines—there are others.

Write us for book with full details.



Mueller Machine Tool Co.

216 W. Pearl St., CINCINNATI, O.

FOREIGN AGENTS—London, Niles-Bement-Pond Co. Japan, China and Far East, Mitsui & Co. Holland, H. G. Aikema & Co., Rotterdam. Switzerland, J. Lambercier & Co., Geneva. Italy, Vaghi, Accornero & Co., Milan. Sweden, Sam. Lagerlof, Stockholm. Montreal, Canada, The Canadian Machinery Agency. Hawaiian Islands, Henshaw, Bulkley Co. Honore Demoor & Co., Brussels, sole agents for Belgium and France.

Dallett

PORTABLE

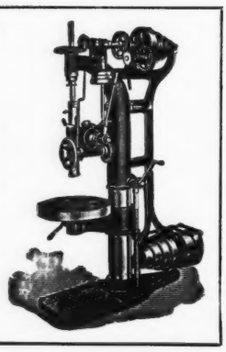
Drills

Are adapted to all classes of drilling. No matter how or where the hole is to be run the DALLET can do it, and do it with less fuss and bother than if the work was taken to a stationary drill.

Let us send you our catalog showing the many styles we make.

THOS. H. DALLETT COMPANY,
York & 23rd Sts., PHILADELPHIA, PA.

A Good Drill Press is a Tool of Many Uses.

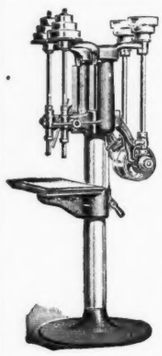


A SIBLEY DRILL in your shop is rarely idle. With proper jigs these machines will accomplish a very large amount of work at a very low labor cost. They are rapid, accurate, have a wide range, are adapted for light or heavy work as occasion requires, and are fitted with all the latest improvements.

Write for Catalogue showing Styles and Sizes of Power Drills.

Sibley Machine Tool Co., South Bend, Ind.

Successors to Sibley & Ware.



SENSITIVE DRILLS

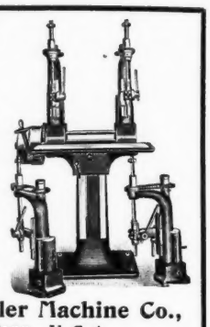
With or without power feed.
1 to 12 spindles.

SEND FOR CATALOG.

Francis Reed Co.
43 Hammond Street, Worcester, Mass.

Mighty handy for jig work

Our Manufacturers' Drill has adjustable top columns, three changes of speed for each spindle entirely independent of each other, lots of power, positive drive, quick changes of speed and plenty more good features which we can't tell about here. Get the catalog.



1 to 6 SPINDLES.

The Fenn-Sadler Machine Co.,
Hartford, Conn., U. S. A.

Save TIME, PATIENCE, and the T Slots in your Planers and Boring Mills by using

Lang's T Heads

Studs used instead of Bolts.
Drop Forged Steel. Case Hardened.

G. R. Lang Co., Meadville, Pa.
Peter A. Frasse & Co., New York.

No Chance for Oil to Run Over

When you use the Delphos Non-Over-filling Factory Dispenser

You can fill your oilers in the dark and still be safe from this kind of accident, because the Delphos has a double tube spout—as soon as the oil gets up to the outlet tube the inlet tube gets busy and the oil is siphoned back into the can. See the advantage? Particularly adapted for filling hand oilers; pumps any kind of machine oil, does the work quickly and easily—no mess, no bother.

Send for Circular. 3, 5 and 10 gal. sizes; galvanized iron.

Delphos Can Co., Delphos, O.

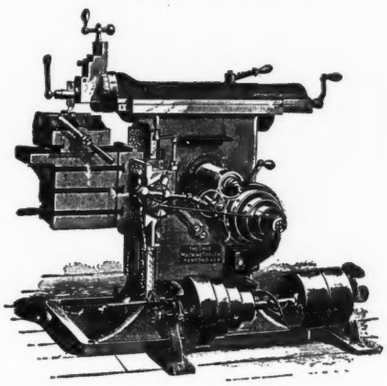
Our Combined Separator and Filter

IS A PRACTICAL OIL SAVER.
Does not require skilled attendant.
Sent on 30 days' trial if desired.

National Separator and Machine Co.
CONCORD, N. H.

16-in. Crank Shaper

Single or Back-Geared.



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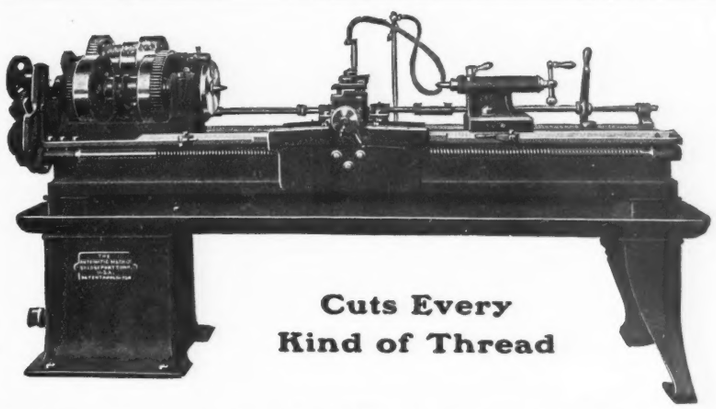

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will cut internal, external, right or left hand, straight or taper threads with equal facility. It is entirely automatic in operation and will do from 25 to 100% more threading than the ordinary lathe, besides insuring accurate work. No special tools required. One attendant can operate several machines.

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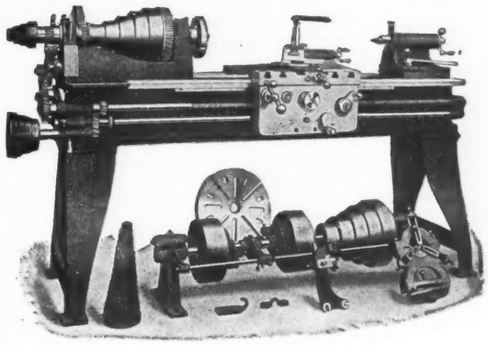

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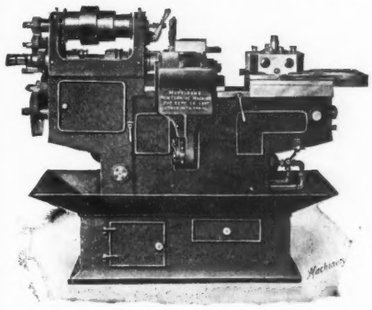

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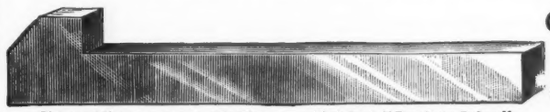

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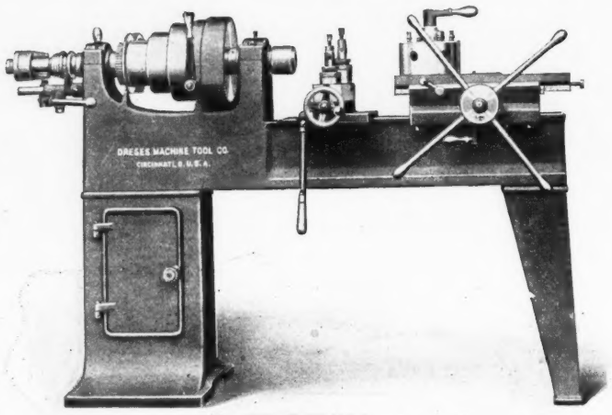

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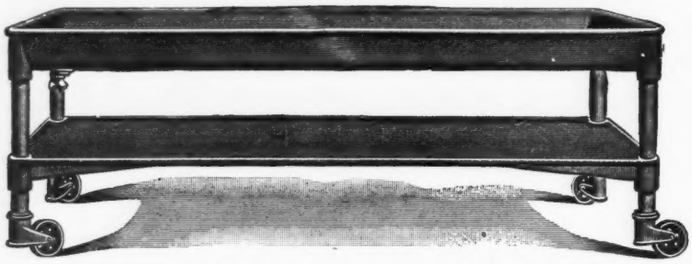
To turn this lathe pan **end for end**—swivel casters facilitate movement in any direction—then when you put an occasional brass job on your lathe there is no need of mixing the brass with the iron chips already accumulated in the pan. That's a point to remember.



Our New All-metal Lathe Pan is just the right height to roll under the lathe easily. The lower tray holds the lathe tools and pieces of work, the upper tray, provided with outlet and strainer, catches the chips and oil. No excuse for splintered, oil-soaked wooden trays with this pan on the market. Price right too. Circular mailed on request.

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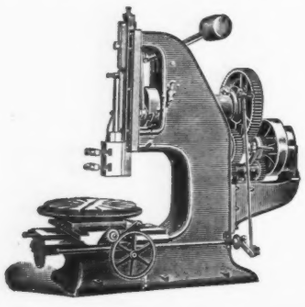

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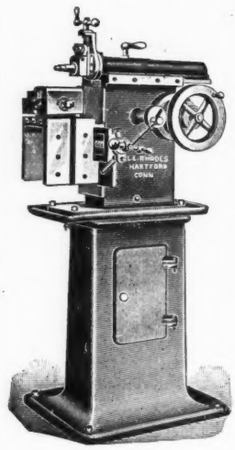

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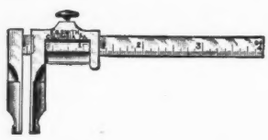

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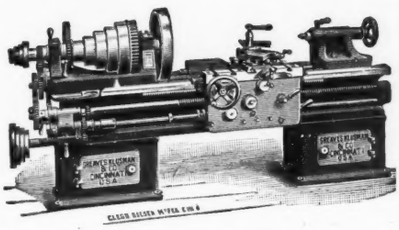

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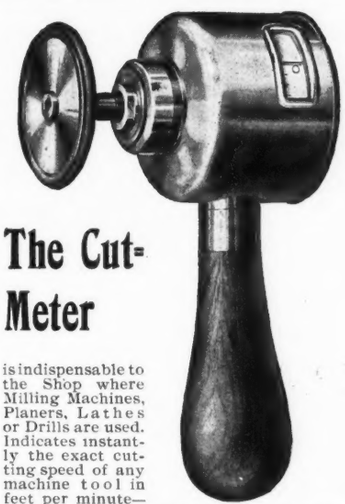

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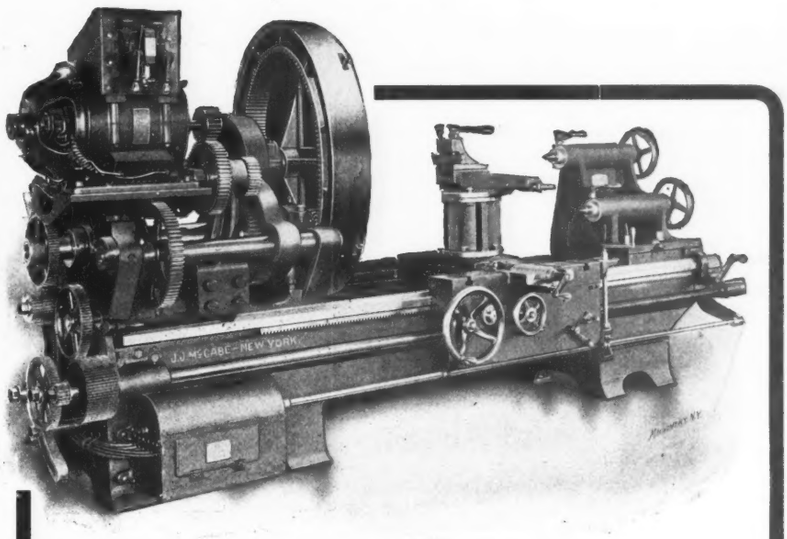

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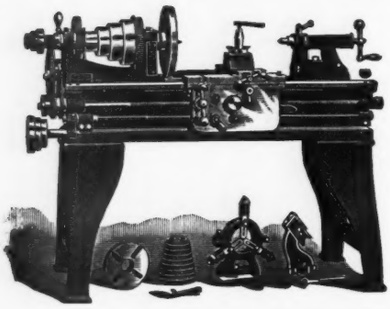

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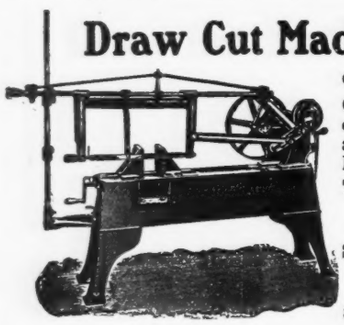

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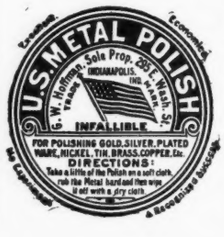

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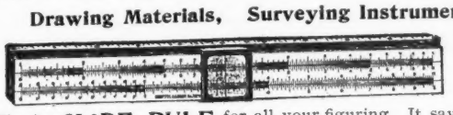

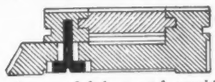

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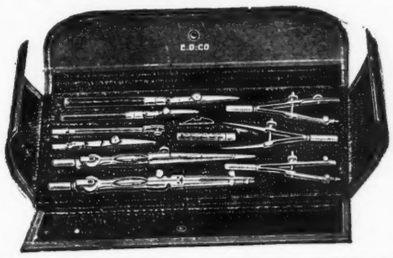

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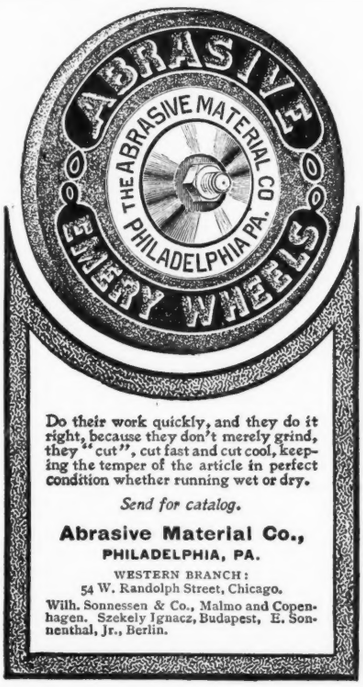

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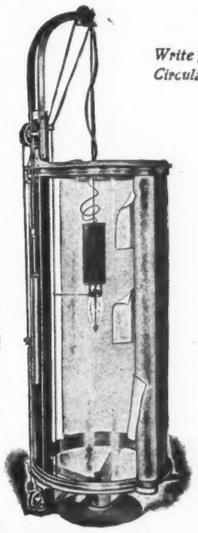

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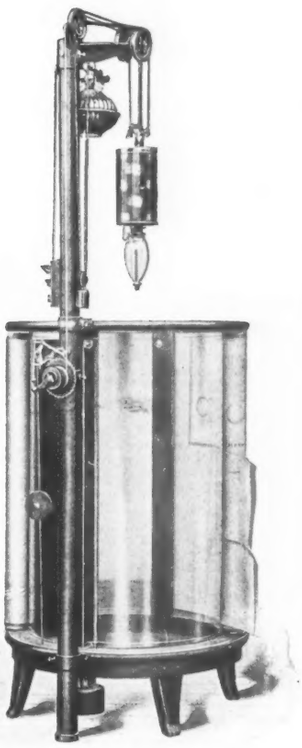

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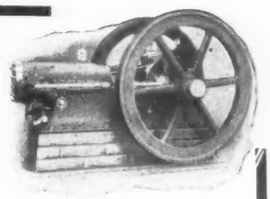

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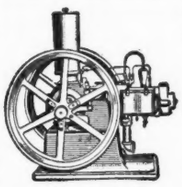

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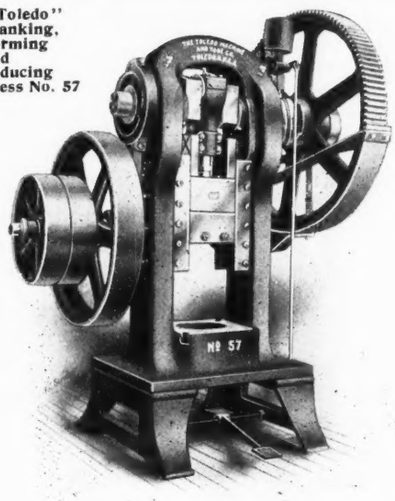

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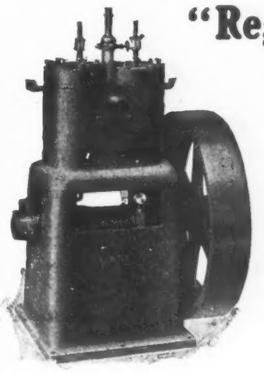

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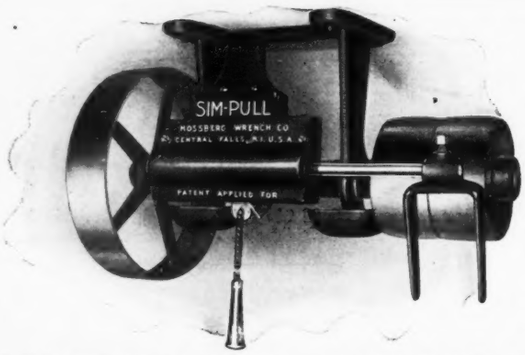

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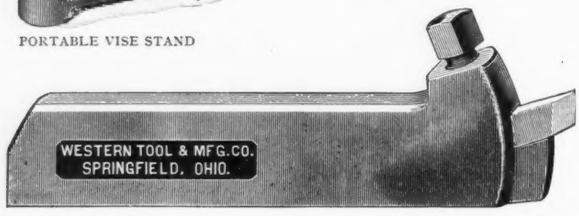

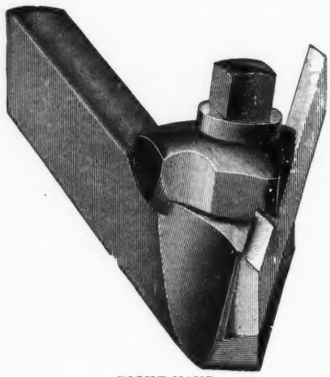
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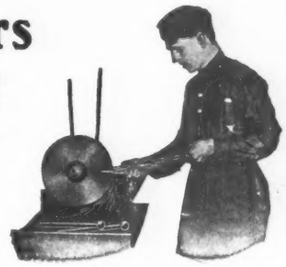

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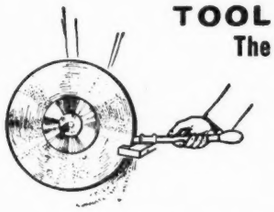

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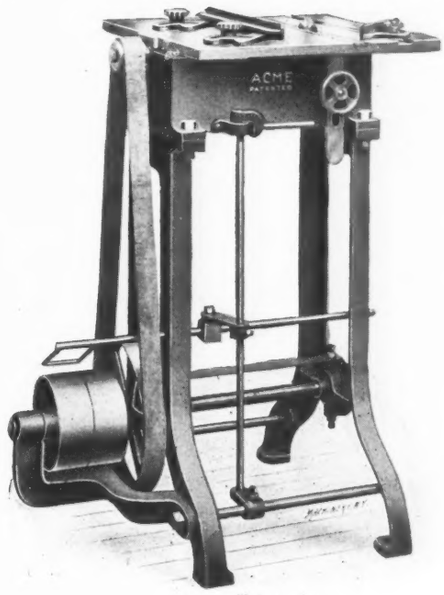

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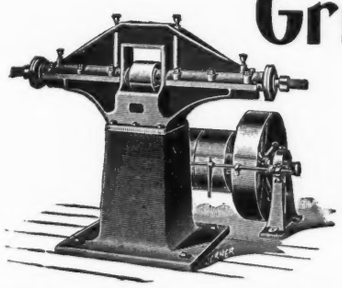

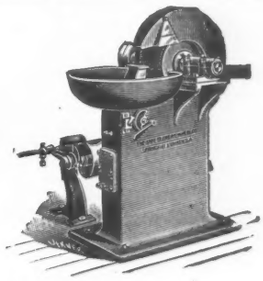

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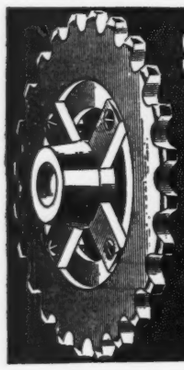

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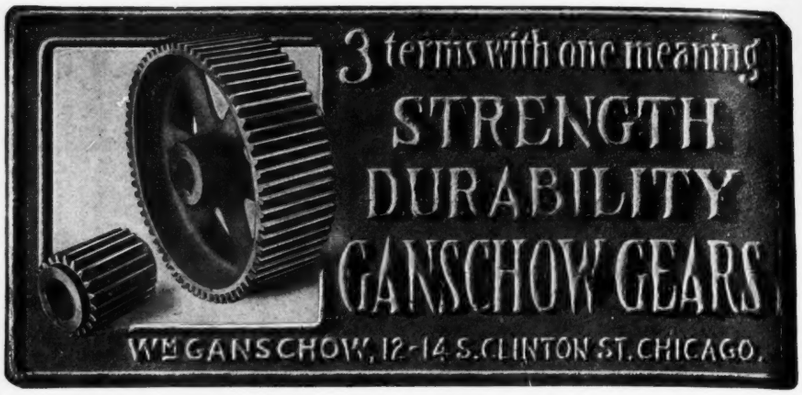

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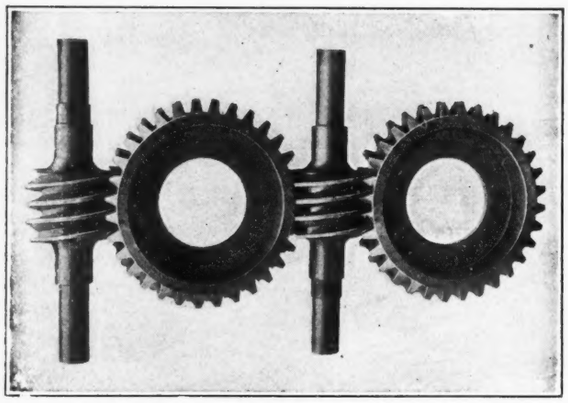

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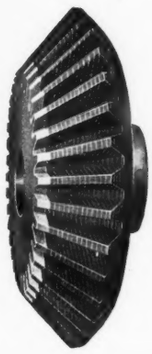

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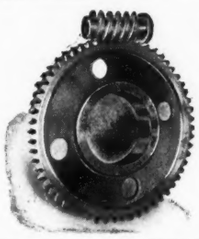

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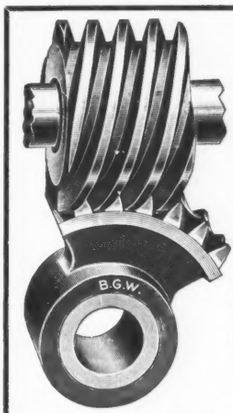

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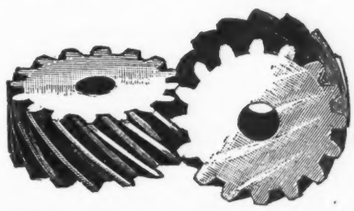

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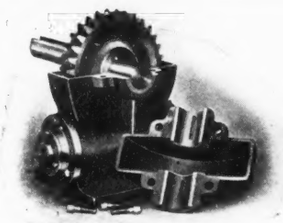

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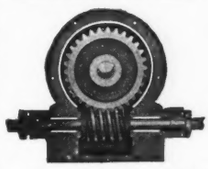

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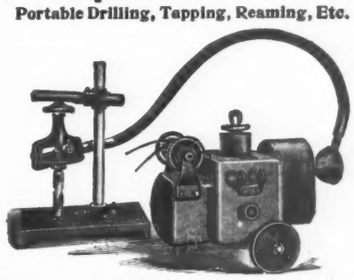

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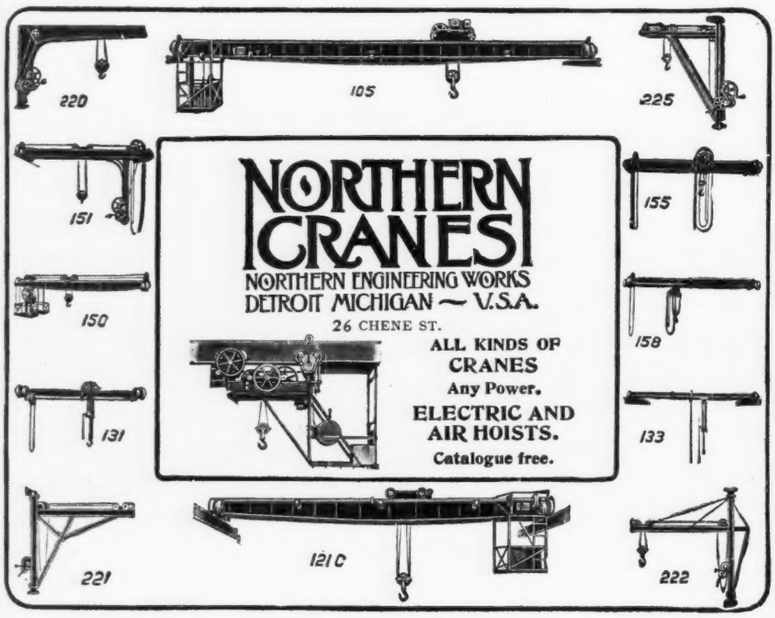

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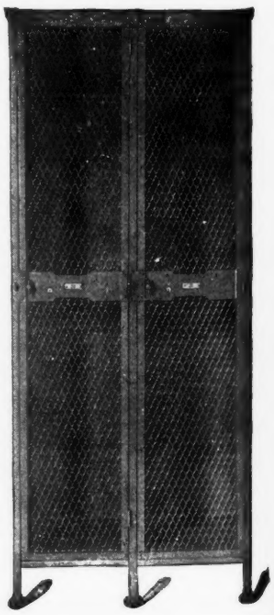

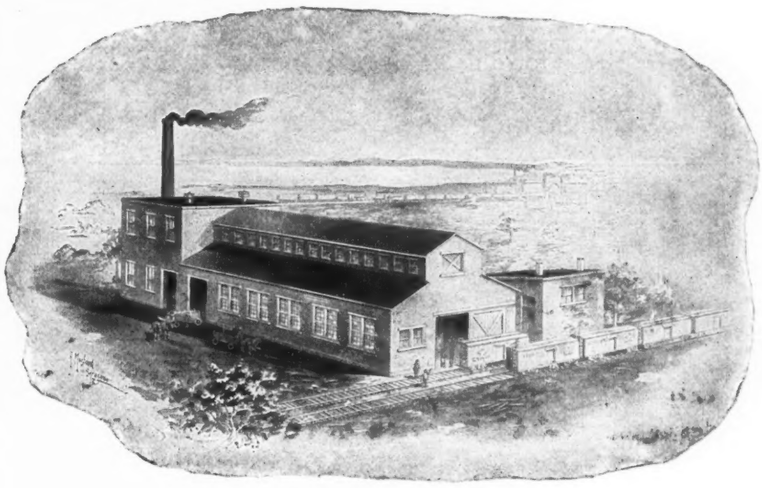

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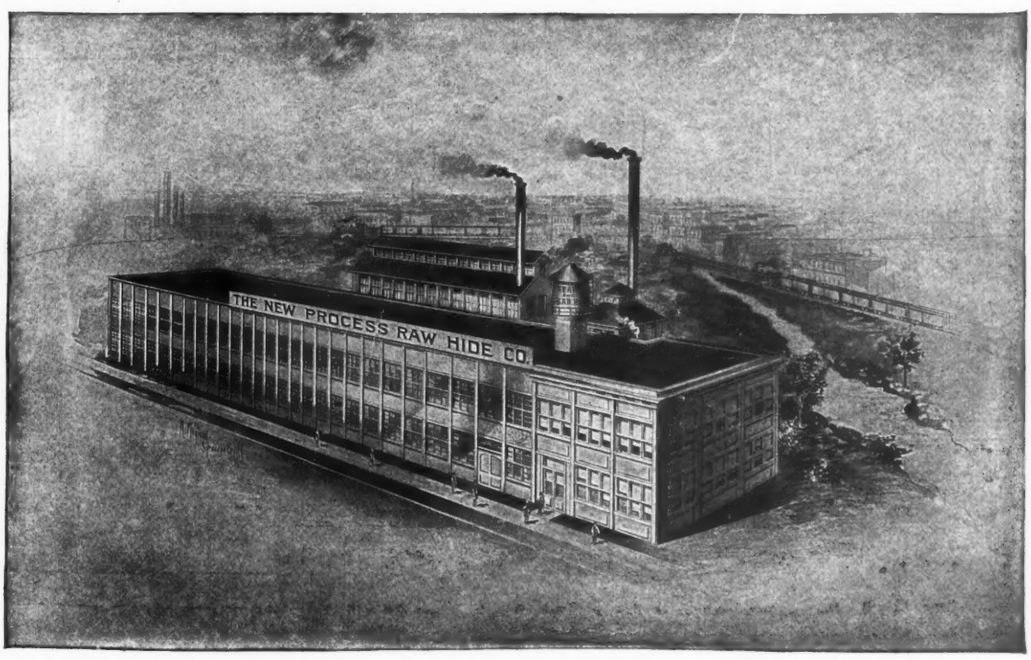

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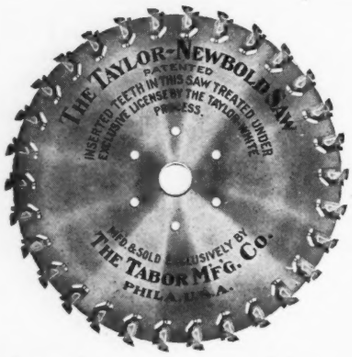
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MFD. & SOLD EXCLUSIVELY BY
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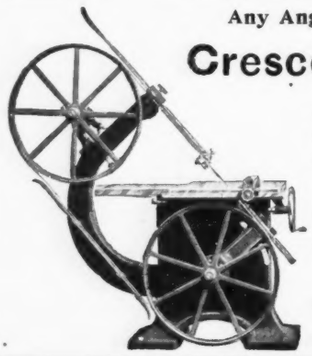

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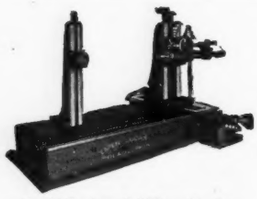

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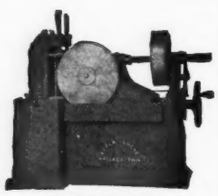

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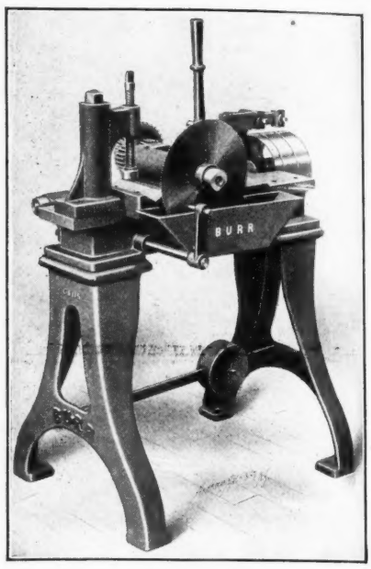

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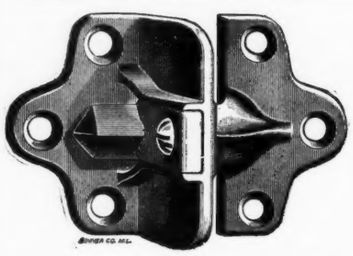

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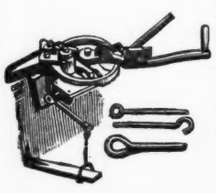

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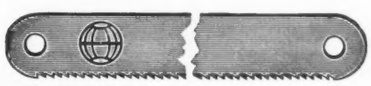

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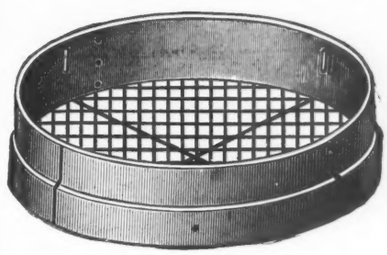

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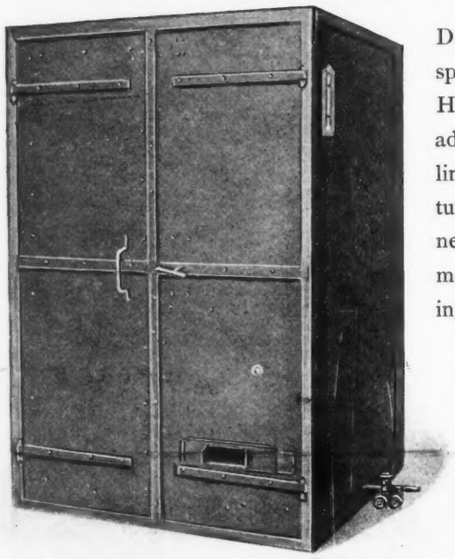

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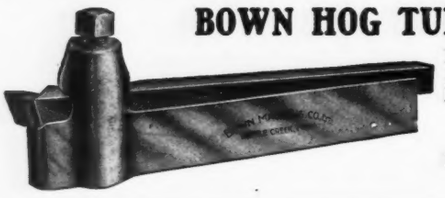

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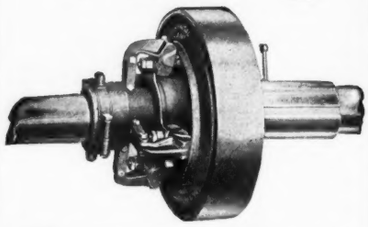

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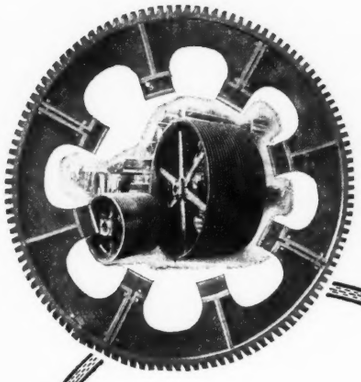

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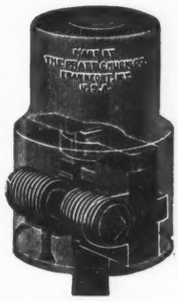


THE PRATT

SINCE HIGH SPEED DRILLING

came to be the order of the day, the sales of the

Pratt Chuck

have bounded upward because it holds the drill so it can neither slip nor break.

Catalog C tells why.

THE PRATT CHUCK CO.
Frankfort, N. Y.

Selig, Sonnenthal & Co., 85 Queen Victoria St., London, Eng., are our European Agents.

THE PRATT

"KEYSTONE"

Safety Shackle-Hook

(PATENTED)

POSITIVELY SAFE SAVES LIFE SAVES PROPERTY

No Chance of Load Slipping or Becoming Detached While in Use, Invaluable in Constructing and Operating Railroads.

Write for Price-List and Discount

KEYSTONE DROP FORGE WORKS
CHESTER, PA.

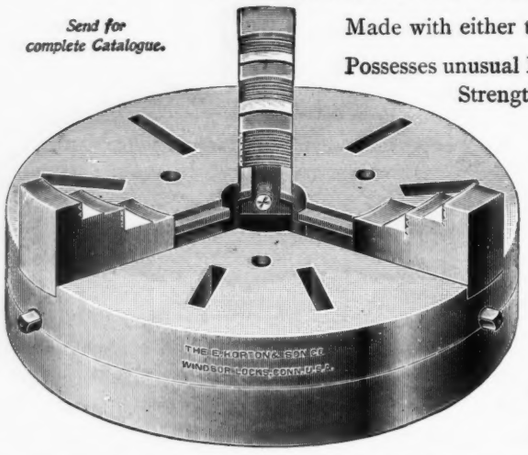
Close Fitting

Quick Acting

New Chuck. Heavy Universal, Three Jaws

18 INCH AND UPWARDS.

Send for complete Catalogue.



Made with either three or four Jaws.

Possesses unusual Pówer, Rigidity Weight and Strength.

Built to withstand the severest strain.

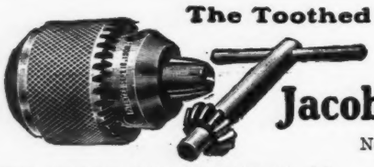
Corresponds with Modern Machine Tools.

We are Specialists, and make nothing but Chucks.

The E. Horton & Son Company,
Windsor Locks, Conn., U.S.A.

The Toothed Sleeve and Key is the feature

OF THE



Jacobs Improved Drill Chuck

No twisting of spindles when tightening drill

THE JACOBS MANUFACTURING CO., • 79 PEARL STREET, HARTFORD, CONN.

Standard Roller Bearing Co.

PHILADELPHIA, PA.

SEND FOR CATALOG.

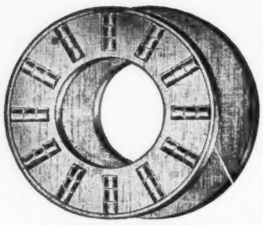
Ball Bearings

Ball Thrust Bearings

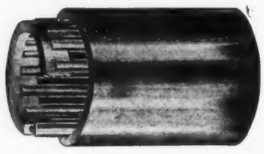
Roller Thrust Bearings

Tapered Roller Thrust Bearings

Save Power and Oil



Plain Roller Thrust.



Journal Roller Bearing.

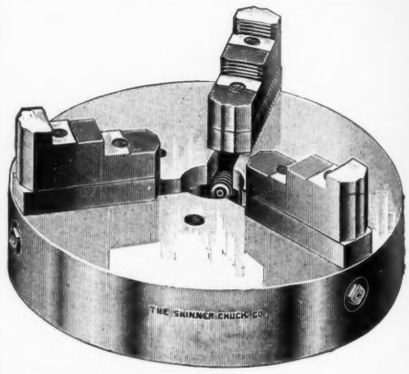
Tapered Roller Thrust.

ELECTROTYPERS

All kinds of plates for printing

THE LOVEJOY CO., Established 1853, **444-446 Pearl St., New York**

Skinner Lathe Chucks.



This is a three jaw Universal Chuck with patent reversible jaws—flush screw heads—also made as a Combination Chuck which can be used either universally or independently. Would you like a copy of our "1906 Price-List"?

THE SKINNER CHUCK COMPANY,

Factory, New Britian, Conn., U. S. A.
New York Office, 94 Reade St.

The Cushman Chuck Co.

HARTFORD, CONN., U. S. A.

Manufacturers of

Lathe and Drill Chucks

Catalogue Free

No Weak Places

In the **Reid Drill Chuck.**

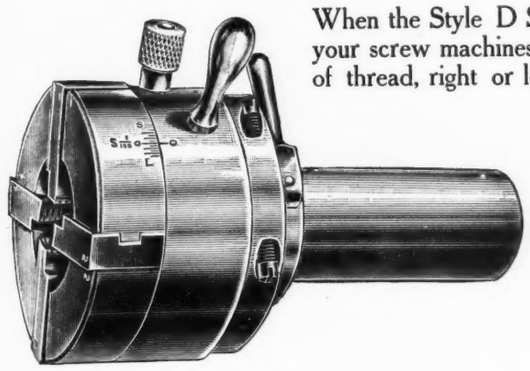
One part is as strong as another. Outwears any other kind of chuck. Made right and sold at the right price. Circulars and price list mailed on request.

R. H. BROWN & CO.
New Haven, Conn.

Send for Catalogue

Fritz & Goeldel Mfg. Co., 60 Alabama St. Grand Rapids, Mich.

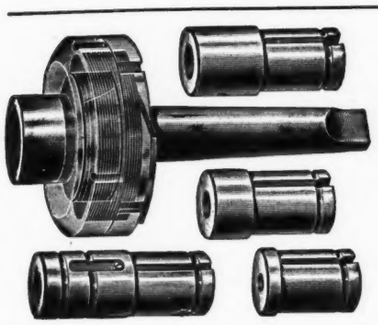
You'll soon notice the Difference in Output and Profit



When the Style D Screw Cutting Die Head takes the place of solid dies in your screw machines. These Die Heads are adapted to cut any size or style of thread, right or left hand, and the length of thread is limited only by the travel of the turret slide. They are very rapid, insuring the maximum output, open automatically at the end of cut, thus averting danger of spoiled work and saving the time usually wasted in running back over finished threads. They are well made, durable and can be furnished in a great variety of sizes. We shall be glad to answer any questions or submit an estimate of suitable outfit of tools on receipt of sample, or drawings showing work you are doing.

The Geometric Tool Company, (Westville Station) New Haven, Conn., U. S. A.

Foreign Agents—Chas. Churchill & Co , Ltd., London, Birmingham, Manchester, Glasgow, Newcastle-on-Tyne. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. Schuchardt & Schutte, Vienna, St. Petersburg, Stockholm, Berlin.



THE

Safety Drill & Tap Holder

is the only attachment for the purpose that gives universal satisfaction, and is

UNEQUALLED in Efficiency, Convenience, Rapidity, Accuracy and Simplicity.

Nothing to Break or get out of Order. Made in 4 sizes, covering from 0 to 2½ in. diameter.

The Beaman & Smith Co., Providence, R. I., U. S. A.

Close examination of the Almond Chuck will reveal an accuracy and mechanical finish unparalleled in any similar device on the market.

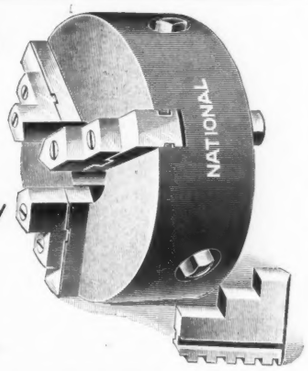
T. R. Almond Mfg. Co.,

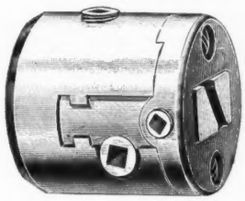
83-85 Washington St., Brooklyn, N. Y.

LONDON OFFICE: 8 White St., Moorfields. FOREIGN AGENTS: Schuchardt & Schutte, Berlin, Stockholm, Vienna, St. Petersburg; Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Barcelona and Bilbao.

"National" Scroll Chuck

Made with either solid or two piece reversible jaw, as desired.





"National" Straight Body Drill Chuck

Made extra strong with powerful grip.

We make a full line of Chucks and shall be glad to Send catalogue on request

ONEIDA NATIONAL CHUCK CO., Oneida, N. Y.

English Representative: Alfred A. Jones, Church Gate, Leicester, England

OUR SPECIALTY,

Automatic Machinery for making Wood Screws,

Asa S. Cook Co., HARTFORD, CONN., U. S. A.

Spur Geared Scroll Combination Lathe Chuck.

If you want the best Lathe and Drill Chucks—buy Westcott's

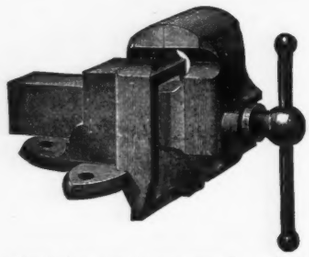
Little Giant Auxiliary Screw Drill Chucks. Little Giant Double Grip Drill Chucks, Little Giant Improved Drill Chucks, Oneida Drill Chucks, Spur Geared Scroll Combination Lathe Chucks, Scroll Combination Lathe Chucks, Geared Combination Lathe Chucks, Geared Universal Lathe Chucks, Spur Geared Scroll Universal Lathe Chucks, IXL Independent Lathe Chucks, Cutting-off Chucks.

Strongest Grip, Greatest Capacity, Great Durability, Accurate.

WESTCOTT CHUCK CO., Oneida, N. Y., U.S.A.

Ask for catalogue in English French Spanish or German.

Little Giant Auxiliary Screw Drill Chuck.



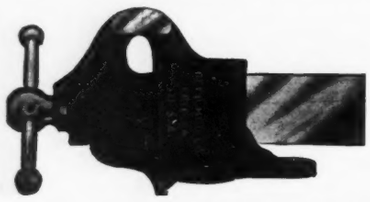
Send for catalogue 17 B, which also shows our full line of fine mechanical tools.

We Claim to Make the Best Line of Vises on the Market.

The Vise shown in cut is our "standard" pattern, made of first-class material so distributed as to produce the greatest strength and durability, the front jaw being reinforced from beneath. It is extra fitted, has jaws of best tempered steel, is convenient in use, and one of its greatest recommendations is the entire absence of complicated mechanism. Unquestionably the best solid nut screw vise made for machinists' use.

ATHOL MACHINE COMPANY, Athol, Massachusetts, U. S. A.

The Three R's in Vise Education



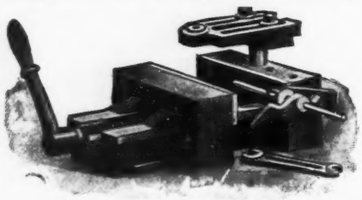
"**Reed**" on a machinists vise stands for **Reliable** construction, **Right** design and satisfactory results.

Ask your dealer for a Reed Vise and take no other. Sold under the strictest guarantee.

Catalogue H on request.

REED MFG. COMPANY, Erie, Pa.

TRY THE UNIVERSAL JIG VISE



Our idea is to provide an absolutely satisfactory vise for general shop use and at the same time have a machine that will hold work for duplicate drilling without the cost of a jig.

Hundreds of users can testify how well the Graham Drill Vise fills this bill. May we have your opinion?

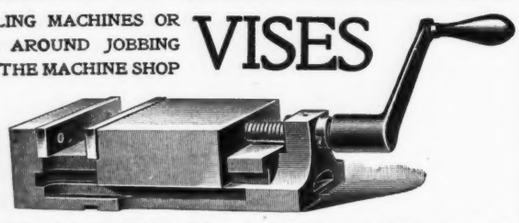
Circulars and full particulars on request.

THE GRAHAM MFG. CO., Providence, R. I.

Canadian Makers: Imperial Vise Co., Galt, Ont. Europe: Chas. Churchill & Co., London.
Fenwick, Freres & Co., Paris. Arthur Kayser, Berlin.

VISES FOR MILLING MACHINES OR FOR ALL AROUND JOBBING WORK IN THE MACHINE SHOP VISES

We have three sizes of these Vises in stock and can make prompt shipment. They are first-class in every particular. Send for circulars.



THE CARTER & HAKES MACHINE CO., WINSTED, CONN., U. S. A.

Or Manning, Maxwell & Moore, Inc., 85 Liberty Street, New York.

HIGH CLASS JOBBING

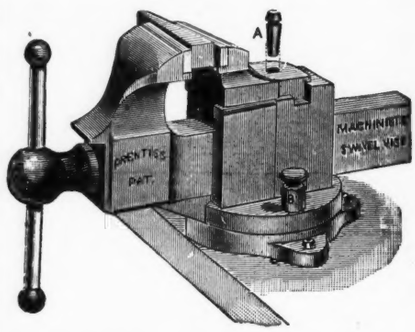
JIGS AND SPECIAL TOOLS

CONTRACT WORK

If your shop is over-crowded we can relieve you of troublesome Tool and Fixture work, and do it right.

THE P. A. GEIER COMPANY

224 High Avenue, S. E. CLEVELAND, OHIO



Machinists' Swivel Vise

with self-adjusting jaw that is as strong and durable as any solid jaw, and a Swivel Bottom that gives any desired adjustment to right or left, and is solid and firm at any angle We make all sorts of good vises, and have been leaders in this line for twenty years. Send for catalogue and price list.

Prentiss Vise Company,

44 Barclay Street, New York.

Agents for Great Britain, Chas. Neat & Co., 112 Queen Victoria St., London, E. C.

IF YOU BREAK THE VISE YOU ARE USING

Try One of These

MERRILL BROS.

469 Kent Avenue, Brooklyn, N. Y.

7 Holders in 1 with an assortment of **22 Tools & Fixtures**

Catalog and particulars sent on request.

O. K. Tool Holder Co., Shelton, Conn., U. S. A.

IT IS SO EASY,

so very much easier to stick to what you have been using for a long time, than to make a radical departure, and try something altogether new. Yes, it certainly is, but the cost of such blind loyalty is often excessive. We have lots of regular users of our **Leviathan Belting,** who, for many years clung to leather, as the only really best belt possible. To what experienced men they knew said in praise of **Leviathan** may be traced their profitable and permanent awakening.

A brief booklet for the busy belt skeptic. Shall we mail it?

Main Belting Company
Sole Manufacturers
1217-1237 CARPENTER ST., PHILA.
55-57 Market St., CHICAGO
120 Pearl St., BOSTON
40 Pearl St., BUFFALO
309 Broadway, NEW YORK

THE GENUINE
GANDY
PATENTED 1877

GENUINE GANDY

Takes a Grip that will not slip.

No matter how much the engine may be overloaded, when the flywheel turns the pulleys on the shafting have got to turn too if GANDY is used as a drive. That's one point in which it differs from leather or rubber belting. Another is its price which is 10 to 25 per cent. below rubber, and 50 to 75 per cent. below leather.

GANDY 6PLY

GENUINE GANDY

GANDY BELTING CO.
BALTIMORE, MD.

Easy Belts
Cling-Surface

They go together.

Ten years ago we began the crusade against the old expensive, troublesome practice of running belts tight.

Today there are hundreds of thousands of belts running easy with Cling-Surface in this country, several thousands in Great Britain, and hundreds in numbers of other countries.

There is absolutely no necessity for your running your belts tight, dragging along a great friction load, having frequent hot journals and pouring in oil to overcome the friction you are making and burning coal to drag it, and keep speed up.

Why should you?

Cling-Surface will let you run every belt you have easy or slack and pull more load than they are pulling now and without slipping. It will cut your friction load in half, give you higher speeds, economy of oil, fuel and trouble, and preserve your belts perfectly.

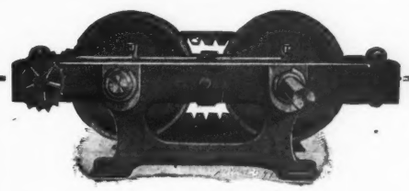
Cling-Surface is a preservative filler for belts and we absolutely guarantee the results.

It is the economical, rational and certainly the best practice, proofs of which are everywhere about you.

Why then do you hesitate to order a trial package and try Cling-Surface?

Will you not send us an order?

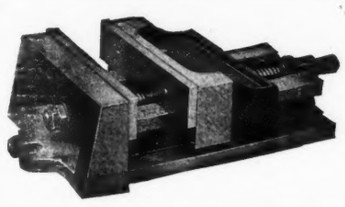
CLING SURFACE CO. 153-159 Virginia St Buffalo N Y
New York Boston Chicago Philadelphia St. Louis
London: Thomas & Bishop, Balfour House, Finsbury.



ALL THE SPEEDS

Demanded for up-to-date work are not obtainable with a cone pulley. There are speeds between the steps of a cone pulley that may be essential to the work on hand, and these speeds and all the others are available through "The Reeves" Variable Speed Transmission. No trouble either—a turn of the hand wheel does it; saves time, saves shifting belts and stopping of work. Catalog?

REEVES PULLEY CO., Columbus, Ind., U. S. A.

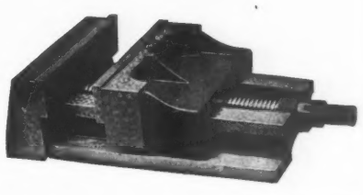


Plunket Improved Vise

For Drill-Presses, Shapers and Milling Machines.

Built of best material and extra heavy to stand the strain of severe work in the machine shop. Steel screw, steel faces to jaw, cast steel handle with each vise. *Write for particulars and prices.*

J. E. PLUNKET, Chicago, Ill.
119 Washington Boulevard.



Bradley Compact Hammer.

If your forging is of a general, all around jobbing character with frequent variations in the size of stock, or

If it is of such a nature that the hammer is not working continuously, but with frequent stops, or

If your floor space is limited but with good height, a Bradley Compact Hammer would prove a money maker.

It is compact in design, occupies but little space and can be run at high speed.

As it weighs considerably less than our regular Upright Hammer its price is much less.

Made with head weighing 15 to 200 pounds.

WE MAKE....
The Bradley Cushioned Helve Hammer.
The Bradley Upright Strap Hammer.
The Bradley Upright Helve Hammer.
The Bradley Compact Hammer.
Forges for Hard Coal or Coke.

SEND FOR CIRCULARS

C. C. Bradley & Son, Syracuse, N. Y.

FOREIGN AGENTS: Schuchardt & Schütte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schütte, Cologne, Brussels, Liège, Paris, Milan, Bilbao. Buck & Hickman, Whitechapel Road, London.

Steam Hammers

In all sizes and for every requirement.

Single Frame & Double Frame

Most complete and extensive equipment for their manufacture.

Largest and most modern line of patterns.

Also STEAM DROP HAMMERS
in all sizes up to 12000 lbs. Falling weight.

CHAMBERSBURG ENGINEERING CO.
Chambersburg, Pa., U.S.A.

"The Rapidity and Weight of the Blow can be Perfectly Gauged."

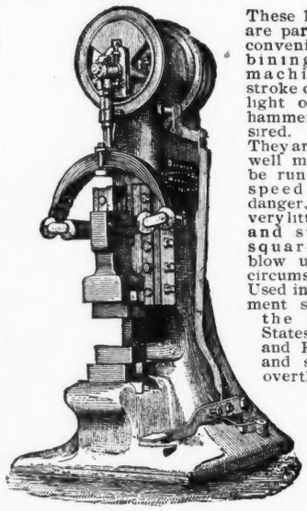
Beaudry
POWER
Adapted for Every
SIMPLE,
DURABLE,

Champion
HAMMER
Description of Forging
EFFICIENT AND
ECONOMICAL

141 Milk St.

Beaudry & Company **Boston, Mass., U.S.A.**

Spring Power Hammers



These hammers are particularly convenient combining in one machine the stroke of a very light or heavy hammer as desired.
They are strong, well made, can be run at high speed without danger, require very little power and strike a square, true blow under all circumstances.
Used in government shops by the United States, France and Russia, and sold all overtheworld.

DIENELT & EISENHARDT, Inc.
1304 No. Howard Street
PHILADELPHIA, PA., U. S. A.

Pressed Steel **Shop Pans or Tote Boxes**
For Machine Shops and Foundries, Bolt Works, Etc.
THOUSANDS IN USE. DURABILITY AND SATISFACTION GUARANTEED.

Cut of Size "H," without Handles.

Made of any Gauge of Sheet Steel desired. Never go to pieces as the common riveted boxes do, and always give entire satisfaction.

Try samples and you would not be without them in your works at any price.

Suitable for handling bolts, rivets, nails, screws, nuts, washers, castings, ore, quartz, and other substances, and for use under lathes and drill presses to catch the turnings, trimmings, borings, oil drippings, etc. Send for Catalogue.

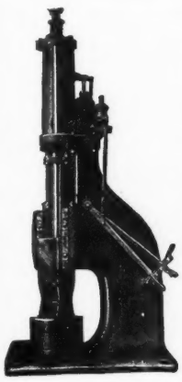
KILBOURNE & JACOBS MFG. CO., COLUMBUS, OHIO.

INDUSTRIAL LOCATIONS

The unparalleled growth of the cotton and other leading interests of the South has opened the way for scores of miscellaneous industries which are new to that section—industries which the increase in population and wealth imperatively demand.

For information about these opportunities in sections reached by the **Southern Railway** and **Mobile and Ohio Railroad,** write

M. V. RICHARDS
Land & Industrial Agent, WASHINGTON, D. C.
A. HELPER, Agent, 271 Broadway, N. Y City

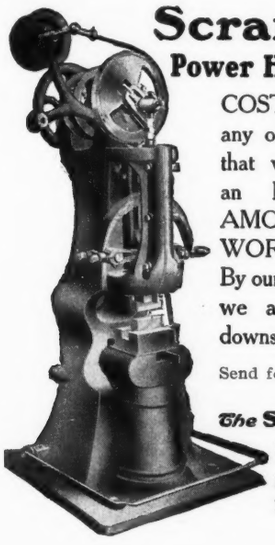


We make the best Steam Hammer on the market and sell it for less money than our competitors.

We also manufacture a full line of Guillotine and Lever Shears, and Rolling Mill Machinery in general, including Galvanizing and Corrugating Machinery.

Send for our new catalog just issued.

ERIE FOUNDRY COMPANY
ERIE, PA., U. S. A.



Scranton Power Hammers

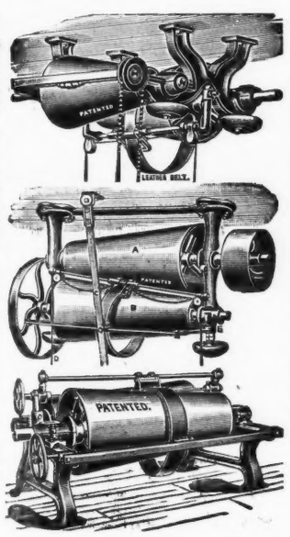
COST LESS than any other hammer that will produce an EQUAL AMOUNT OF WORK.

By our construction we avoid breakdowns.

Send for Circular 37.

The Scranton & Co.
New Haven, Conn.

Evans Friction Cone Pulleys

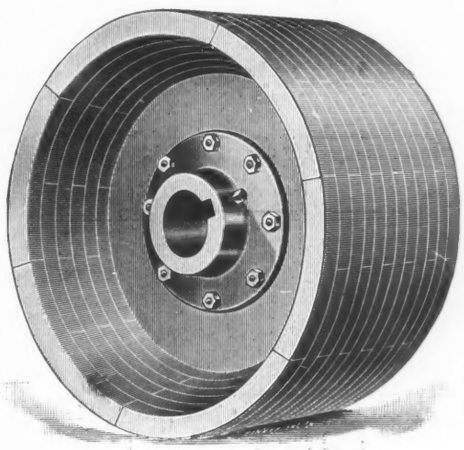


1 to 40 H. P. for changing speed of machinery while running. Send for Catalogue.

G. F. EVANS, - NEWTON CENTER, MASS.

For Dynamos, Trip Hammers or other Heavy Work.

We manufacture a solid web pulley especially adapted for extremely severe service and guarantee that it will do the work specified, no matter how heavy. Style D. built of selected, thoroughly seasoned maple, having an iron center fitted with key seat and set screw, is the lightest, strongest, stiffest and best finished Dynamo Pulley on the market.



STYLE D. SPECIAL PULLEY.

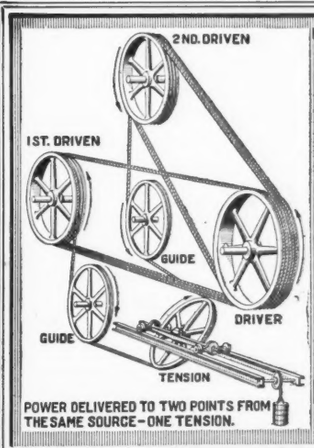
The Gilbert Wood Split Pulleys are universally acknowledged to be as perfect, both in material and construction, as it is possible to make them, and can be used successfully wherever a belt can be operated. Excel all others in correctness of balance and trueness of running.

Write for illustrated catalogue and price list.

Saginaw Manufacturing Co., Saginaw, W. S. Mich.

SALES AGENCIES IN ALL THE PRINCIPAL CITIES IN THE WORLD.

New York Branch, 44 Dey St., 'Phone, 187 Cortlandt. Chicago Branch, 35 South Canal St. Cable Address, Engrave. A. B. C. and Lieber's Codes.



"ROPE DRIVING"

IS THE STEADIEST AND QUIETEST OF ALL SYSTEMS FOR TRANSMITTING POWER.

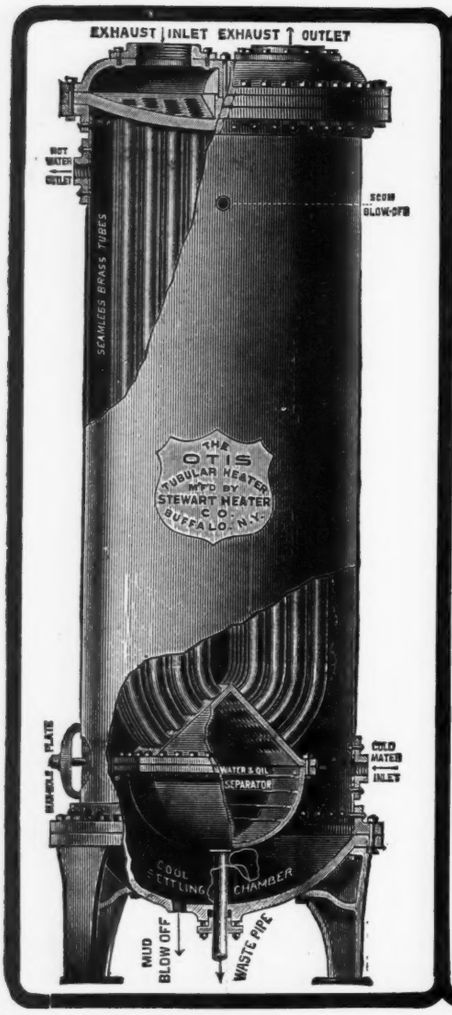
OUR INSTALLATIONS CONVINCE

GEO. V. CRESSON CO.
POWER TRANSMITTING MACHINERY
PHILADELPHIA AND NEW YORK

Inventions Developed. Special Tools and Machines designed and built.

Also Patterns, Models and Automobile work.

BLAIR TOOL AND MACHINE WORKS, 24, 25, 26, 27 West St., New York City



THE OTIS

Tubular Feed Water Heater, Oil Separator and Purifier

is not an experiment but a tried and tested appliance that the makers are not afraid to

GUARANTEE

To heat the feed water to the *boiling point* (210 or 212 degrees) with the exhaust steam without causing any back pressure, *also to extract the oil from the exhaust*, so that the exhaust steam after being passed through the heater can be used for heating purposes, and the water of condensation for the heating system be returned to the boiler without the *additional expense* of an *eliminator*.

We are so sure of the OTIS that we agree to pay all cost of a trial—freight, cartage, piping, etc., if it fails to do all we claim for it.

Catalogue and Prices at Your Service

The Stewart Heater Company

79-99 East Delevan Ave., BUFFALO, N. Y.

POOLE ENGINEERING & MACHINE CO.
ENGINEERS, FOUNDERS AND MACHINISTS,
BALTIMORE, MD.
MANUFACTURERS AND DESIGNERS OF ALL KINDS OF
HEAVY MACHINERY
REQUIRING FIRST CLASS WORKMANSHIP AND MATERIALS
BAND, ROPE AND FLY WHEELS; FRICTION CLUTCHES; SHAFTING, PULLEYS AND HANGERS;
MACHINE MOLDED AND PLANED GEARING
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POOLE-LEFFEL TURBINE WATER-WHEELS
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IRON CASTINGS 30,000 LBS. TENSILE STRENGTH

Dixon's Graphite Lightens Your Work

The use of Dixon's Flake Graphite on your engine will save you work and worry. Less oil will be required, piston packing will wear longer, and repairs due to faulty lubrication will not occur.

We will send you booklet 74-C fully explaining graphite lubrication and free samples at your request.

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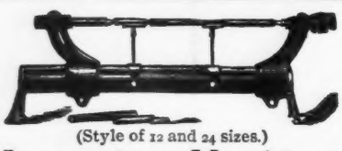

(Style of 12 and 24 sizes.)

Measuring Machines.

Measuring screw, 10, 16 or 20 threads to the inch, graduated to read thousandths or 32ds without calculation.

The only Micrometer that will not lose its accuracy by wear.

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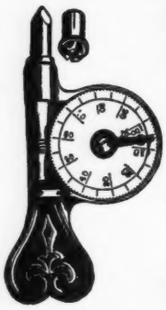

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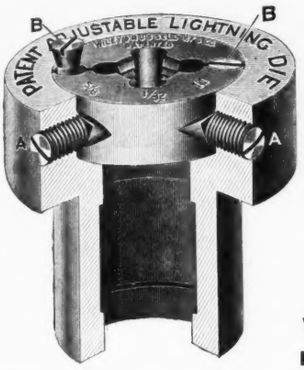
An ingenious little instrument for ascertaining the correct speed of Dynamos, Steam Engines, Shafting, Floor Machines, etc. No first class mechanic, superintendent or factory should be without one. They are adapted to hollow or pointed centers, and are absolutely correct. Every indicator is handsomely nickel-plated and of convenient size to carry in the pocket.

Price: Split Cap, adapted to either pointed or hollow centers, $1.00.
Plain Cap, for hollow centers only, 75c.

We also keep a Double Registering Speed Indicator. Prices on application.

The R. Woodman Mfg. and Supply Co., 63 Oliver Street BOSTON, MASS.



GREEN RIVER
BOLT CUTTERS
AND
NUT TAPPERS

STRONG AND RELIABLE - PRICES RIGHT

Send for Catalog No. 33 E, giving full description.

MADE BY

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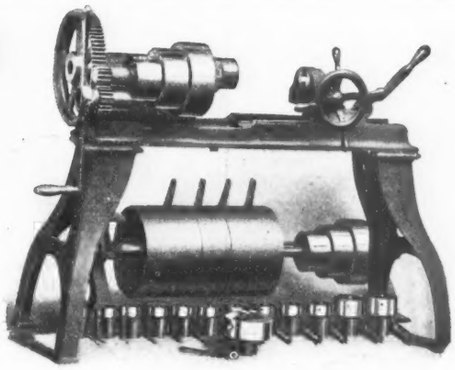


Right or Left Hand Threads

can be cut in the same chasers in the

Landis Die

A wide range of special work covered and the die gives ten times the service of any other.

Additional advantages are: no hobbing, annealing or retempering needed, the positive lead, correct clearance and permanent throat.

Write for circulars of the Landis Bolt Cutter—Single, Double and Triple Head Machines in all standard sizes.

LANDIS MACHINE CO.,
Waynesboro, Pa.

SHEARING PUNCHES FOR HEAVY WORK.

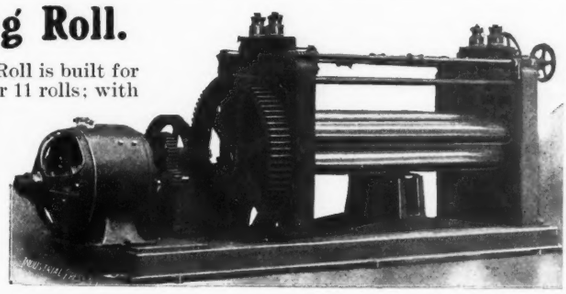
They go through the Metal easy.

Punches and Dies for all sizes of Rivets. First class work and satisfaction given.

Straightening Roll.

This Straightening Roll is built for any capacity, with 7, 9 or 11 rolls; with Motor, Engine or Belt Drive. The top rolls have independent and universal adjustment.

We build a complete line of Shears, Punches and Bending Rolls, all sizes up to 75 tons in weight.

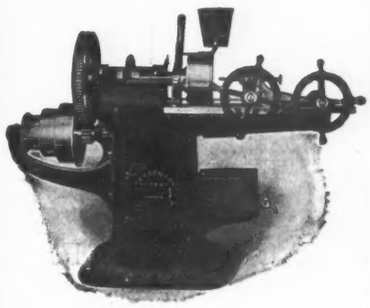


BERTSCH & COMPANY, Cambridge City, Ind.

A Bolt Cutter is much like a man in this:

THE HEAD

is nearly everything.



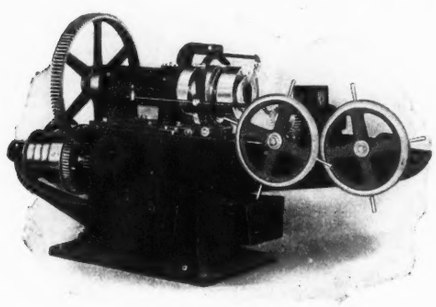
The Merriman Standard Bolt Cutter

is noted for—

1. SIMPLICITY OF THE HEAD: Only Four Parts, consequently,
2. GREAT DURABILITY, few repairs needed.
3. SQUARE BEARING OF THE DIES IN THE RING, consequently,
4. SOLIDITY OF THE DIES LIKE A SOLID DIE, consequently,
5. UNIFORMITY OF THE PRODUCT: Bolts all the same size.
6. EFFECTIVENESS OF OPERATION: Cheapest help can understand and run it.

Send for catal gue No. 10.

The H. B. Brown Co.
Box B., **East Hampton, Conn.**

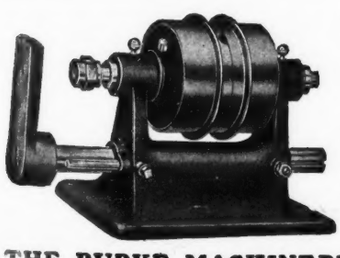


Standard 3 inch Single Bolt Cutter.

THE STANDARD
"The Bolt Cutters of Quality."

There is no question about the advantages of these machines for rapid production and accurate work. They are simple, durable, and are designed to combine all the good points of other makes with the special "Standard" features. We solicit a trial—if not satisfactory return the machine.

The Standard Machinery Co.
Bowling Green, Ohio

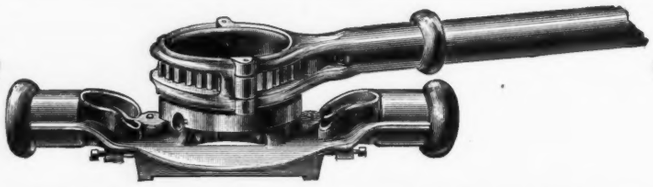


For fine tapping, in quick time, with least expenditure for taps, our

No. 1½ Tapping Machine

with friction drive has first place. It is very sensitive; runs smoothly and noiselessly; has no gears, pins or clutches to wear out; capacity up to 3-16". Always ready. Reverses quickly. Saves tap breakage. Circulars on request.

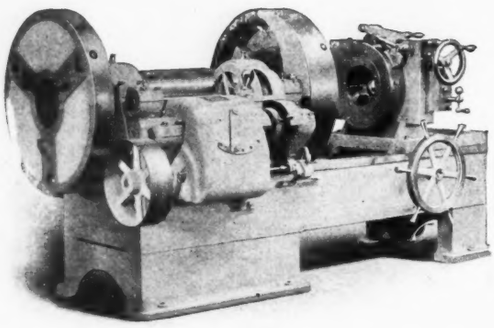
THE BURKE MACHINERY CO., 5 Power St., Cleveland, O.



SAVES ALL THE TROUBLE OF TAKING DOWN THE PIPE AND THREADING IT AT THE WORK BENCH

The Ratchet Attachment for the Armstrong Die Stocks enables the fitter to thread pipe in a ditch, in a corner or when it runs near a ceiling or wall. A light, compact, strong and serviceable tool. Fits all *genuine* Armstrong Stocks. Costs but little. Write for catalog and prices.

297 KNOWLTON ST. **THE ARMSTRONG MFG. CO.** BRIDGEPORT, CONN.



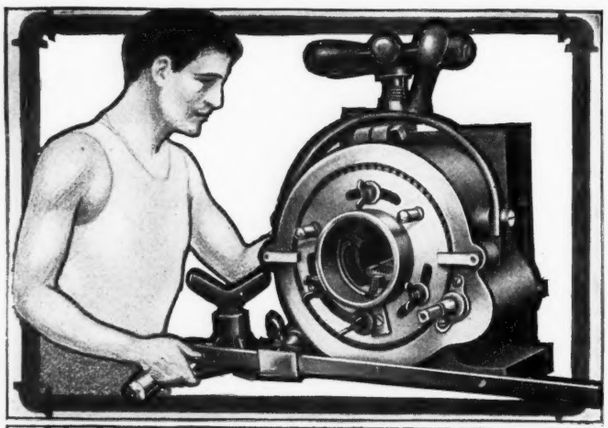
PIPE MACHINES

HERE is our 6-inch machine. Chunky, solid and substantial, but runs as easy as a sewing machine.

It has solid headstock, ten speeds, gears running in oil, interchangeable cams and plates in the head. Its a glutton for work.

Send for booklet.

THE STOEVER FDY. & MFG. CO.
Myerstown, Pa.



HERE are many arguments in favor of Forbes Patent Die Stocks.

Before the Forbes machine was invented the pipe threading proposition was a serious problem. With the Forbes instrument it is possible to cut and thread pipe up to sixteen inches by hand power. The operation is extremely simple—*one man can do the work of four* and do it better.

Interesting catalogue if you'll write.

THE CURTIS & CURTIS COMPANY,
8 GARDEN ST., BRIDGEPORT, CONN.
New York Office: 60 Centre St.

Pipe Threaders and Cutters

With efficiency as well as beauty.

Heavy—none more so; bed cast in one piece, no stands nor legs to work loose. No oil soaked floors; fire risk reduced.

Single speed pulley; all-gear speed changes through semi-steel cut gears.

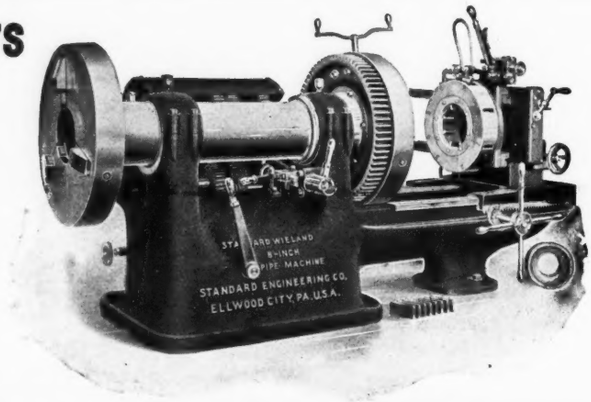
Deep chasers cutting long taper perfect threads in one cut as easily on steel as on iron pipe.

Let us prove to you that the higher cost for a modern tool is justified by the character and quantity of its product. Circulars for the asking.

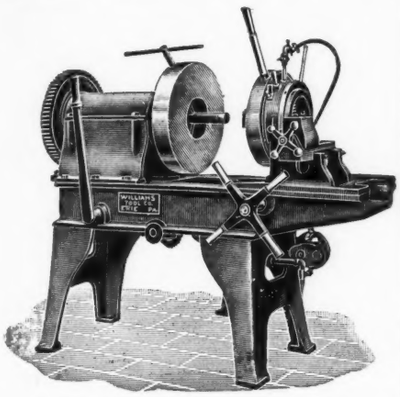
Standard Morgan Bolt Threaders.

Standard Engineering Co.,
Ellwood City, Penna.

New York Office: 123 Liberty St. St. Louis Office: 1012 Chemical Bldg.



HIGH GRADE PIPE WORK



Our Pipe Cutting Machines are built from new designs; fitted with quick opening, adjustable dies; have 6 changes of speed without removing a gear; are strong, durable, rapid and adapted for the most accurate lines of work. Capacity from ¼″ to 12″.

Catalogue on request.

Williams Tool Co., Erie, Pa.

"Trimo" A Mechanical TRIUMPH

America's Leading Pipe Wrench

ALWAYS RELIABLE

Gold Medal at St. Louis, 1904

Save Time and Money

spent in repairs by using the "Trimo". Improved until it has no equal for strength. Steel, Drop Forged; all parts interchangeable; each thoroughly tested and guaranteed. Has inserted Jaw in handle, easily and cheaply replaced.

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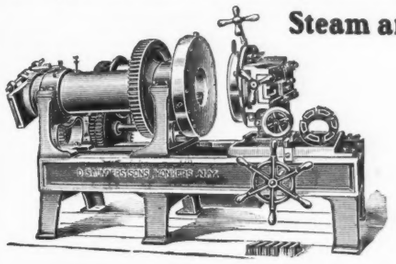
LUIS JACKSON

Industrial Commissioner Erie Railroad Company

21 Cortlandt Street, New York

Pipe Threading and Cutting Machines

Steam and Gas Fitters' Hand Tools



All our machines are of improved design and unsurpassed for efficiency of operation and quality of workmanship.

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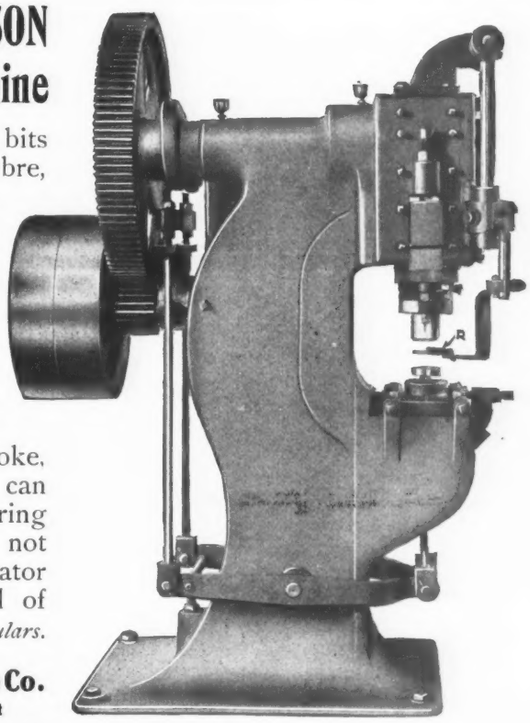
D. Saunders' Sons

YONKERS, N. Y.

THE KRIPS-MASON Punching Machine



will convert your odd bits of brass, copper, fibre, scrap iron or steel, either hard or soft, into washers, armature discs, hardware and electrical specialties quickly and at small cost.

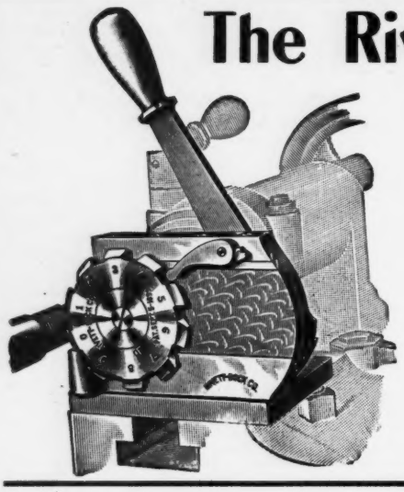
It is a great time saver, cutting and punching at one stroke, single or multiple; can be arranged for shearing when desired, does not require a skilled operator and handles material of any shape. *Write for circulars.*

Krips-Mason Machine Co.

1636 North Hutchinson Street

Philadelphia, Pa., U. S. A.

The Rivett-Dock Threading Tool

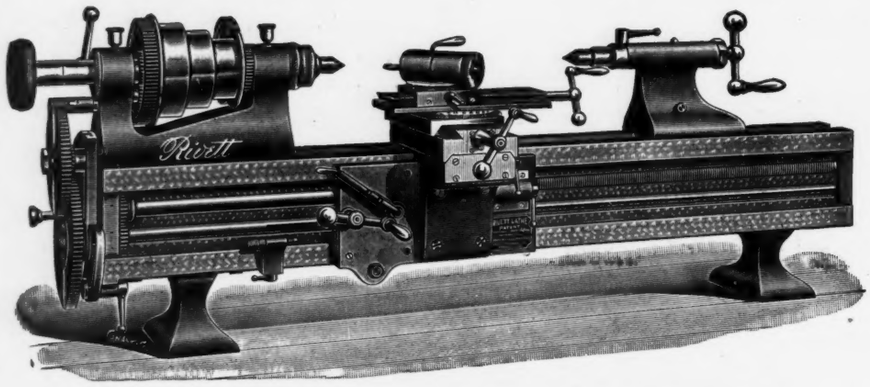


Has beaten the old single point tool to a standstill and is still rolling up new records. When you have accurate threading to do, and duplicate work this tool is practically indispensable—it not only does better work but will do it in from 1-3 to 1-10 the time formerly required, can be operated by unskilled labor and needs very infrequent grinding.

Let us send a tool on thirty days probation. A trial will convince you. 1906 Catalogue on request.

The Rivett-Dock Company, Brighton, Boston, Mass.

For Toolmakers, Makers of Fine Instruments, For Experimental Work



For all classes of work which require the extreme of accuracy,

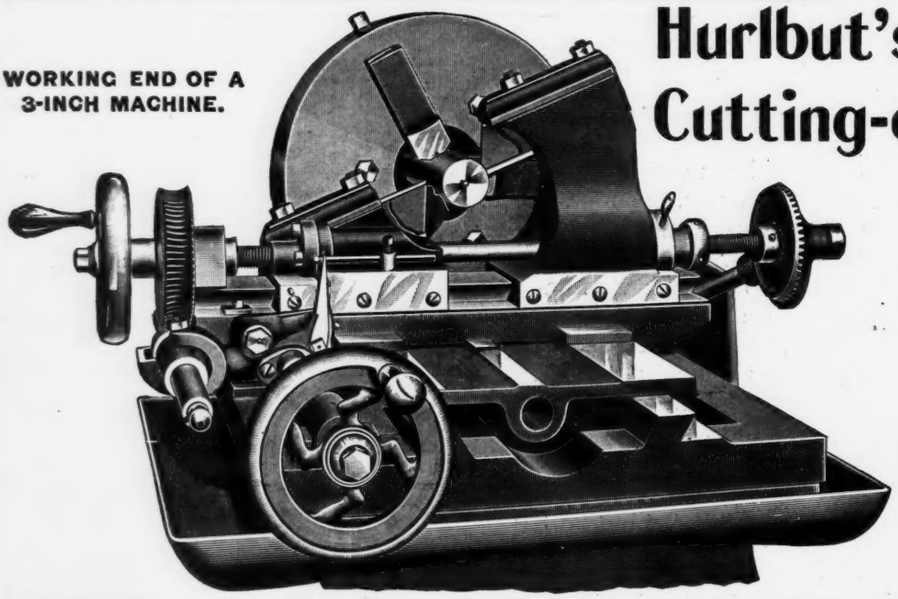
The Rivett Precision Lathe

comes nearer to the ideal than any other tool made. Though designed and adapted for the most delicate operations it has strength and rigidity to stand much heavier work and is equipped with every improvement.

Send for 1906 Catalog.

Rivett Lathe Mfg. Company, Brighton, Boston, Mass.

WORKING END OF A 3-INCH MACHINE.



Hurlbut's Patent Cutting-off Machine

Made in 2-inch, 3-inch, 4-inch, 5-inch, 6-inch, 8-inch and 10-inch sizes.

Circulars on application.

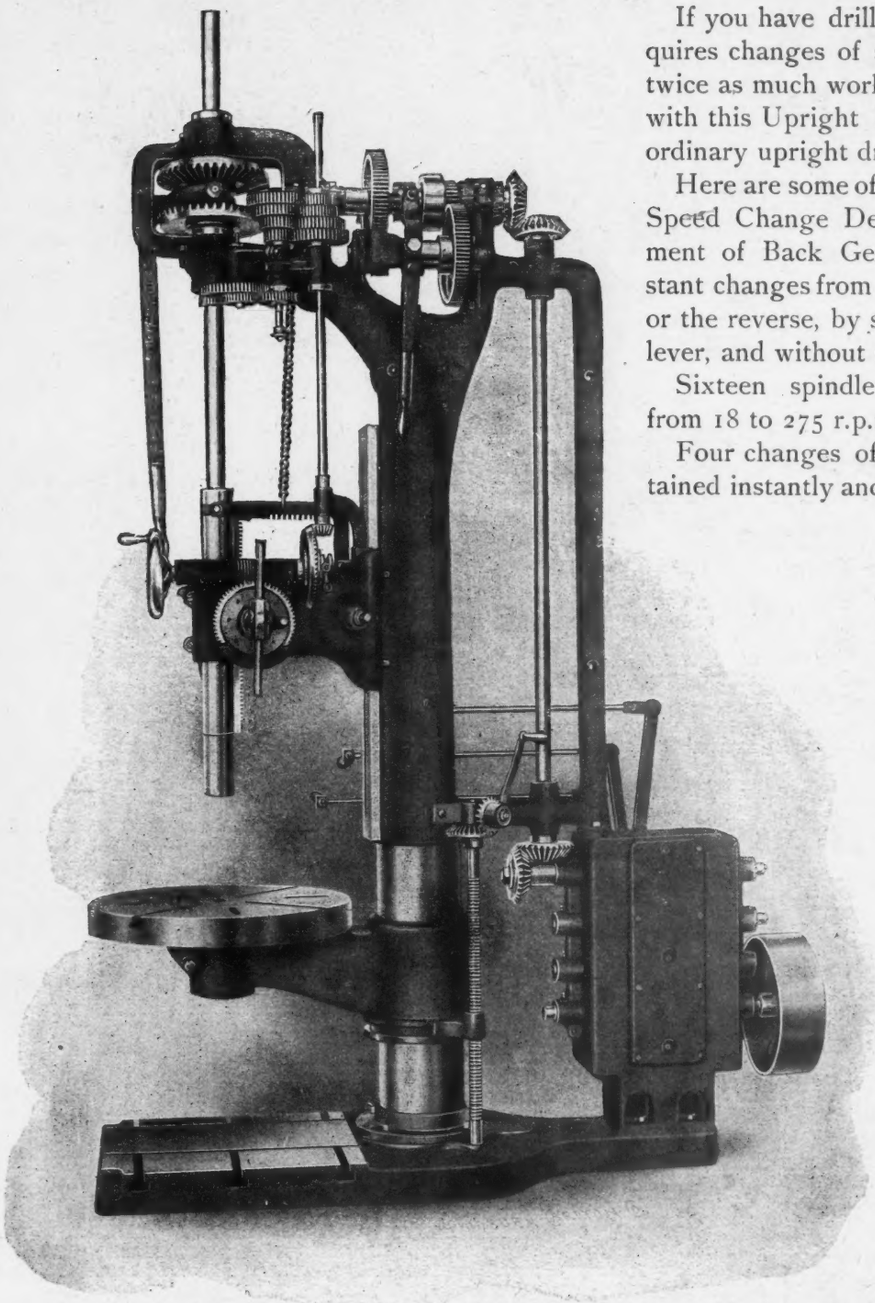
HURLBUT-ROGERS MACHINE CO.

So. Sudbury, Mass.

Your "Stock Account" will show a larger "credit," if you use McCullough-Dalzell Crucibles. They turn out more stock, in proportion to cost than other makes. Write for prices.

McCULLOUGH-DALZELL CRUCIBLE COMPANY, PITTSBURGH, PA.

The Drill of the Future



If you have drilling to do that requires changes of speed, you can do twice as much work in a given time with this Upright Drill as with any ordinary upright drill.

Here are some of the reasons: Gear Speed Change Device—an arrangement of Back Gears permitting instant changes from high to low speed, or the reverse, by simply operating a lever, and without stopping machine.

Sixteen spindle-speeds ranging from 18 to 275 r.p.m.

Four changes of geared feeds obtained instantly and without stopping the machine.

The geared feed eliminates slipping-feed-belt troubles.

Our improved quick return and stop motions make it possible to raise or lower the spindle and engage or disengage the power feed with one lever and with one hand.

Write by return mail for circulars and full details.

PRENTICE BROS. COMPANY

"Builders of Radial and Upright Drilling Machines, Engine and Turret Lathes"

WORCESTER, MASS., U.S.A.

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Gorton Disc Grinders

Our No. 6-W is useful in shops where two operations are required of one machine.

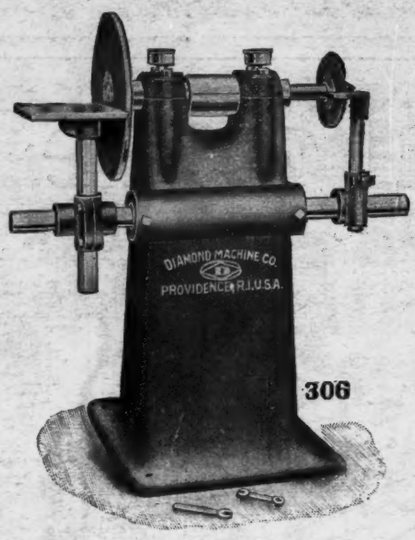
The left end is fitted with a steel disc and a 10" x 12" table which is square with the face of the disc and has 9" vertical adjustment. The work is rested upon the table and forced against the disc by hand.

The right end is provided with a 10" x 1" emery wheel and tool rest. This allows the machine to be used for grinding small tools.

A catalog of 94 pages describes our complete line of Gorton Grinders.

Shall we send it to you?

Diamond Machine Co.
Providence, R. I.



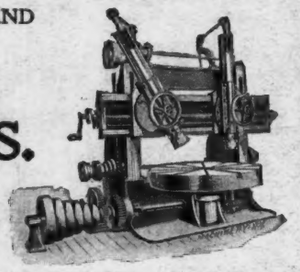
STAR HACK SAW MACHINE

Cuts up to 4 1-2 inches in diameter and adapts itself to all kinds of work. Takes care of itself when making cut, and stops when the work is done. No tool that we have ever made has given better satisfaction. Price $75.

MILLERS FALLS CO.
28 Warren St., N. Y.

Boring and Turning Mills.

4, 5, 6, 7 AND 8 FOOT SWING



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TWELVE MEDALS awarded at INTERNATIONAL EXPOSITIONS.

GRAND PRIZE GOLD MEDAL at Atlanta, Ga., 1895.

Catalogue sent free to any interested file user upon application.

G. & H. BARNETT COMPANY, - Philadelphia, Pa.

Grinding and Polishing Machinery

PATENT "PULL" COUNTERSHAFTS. TRADE MARK

BUILDERS IRON FOUNDRY, Providence, R. I.

DROP PRESSES

For all Purposes Our Specialty.

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THE ORIGINAL AND BEST

The "Wiley" Electrical Driven Center Grinder

was the first in the field and still holds the top position. Adapted also for cutter grinding and for internal, surface and cylindrical grinding. Three sizes. 110 or 220 volts. Direct current.

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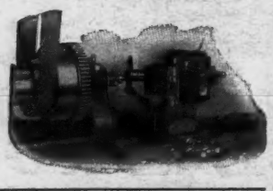

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Only half as much required in the manufacture of brass or bronze and a superior result obtained. Used in the United States Navy and in the leading foundries throughout the country. *May we send leaflet with brass foundry formulas?*

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Foundry Engineers

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